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Vol. X, No. 6 JUNE, 1921

JOURNAL
OF THE
AMERICAN PHARMACEUTICAL ASSOCIATION

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Published Monthly by the American Pharmaceutical Association: Office of Publication, 211 Church St., Easton, Pa. Editorial Office, 253 Bourse Building, Philadelphia, Pa. Annual Subscription, $4.00; Single Numbers, 35 Cents.

THE SIXTY-NINTH ANNUAL CONVENTION OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN NEW ORLEANS, LA., DURING WEEK OF SEPTEMBER 5, 1921

FOR R. R. TRANSPORTATION NOTES SEE P. XI, ADVERTISING DEPARTMENT, THIS ISSUE

The 1921 meetings of the American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy will also be held in New Orleans during Convention Week

Entered as Second-class Matter, January 23, 1917, at the Post Office at Easton, Pa., under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized July 10, 1918.

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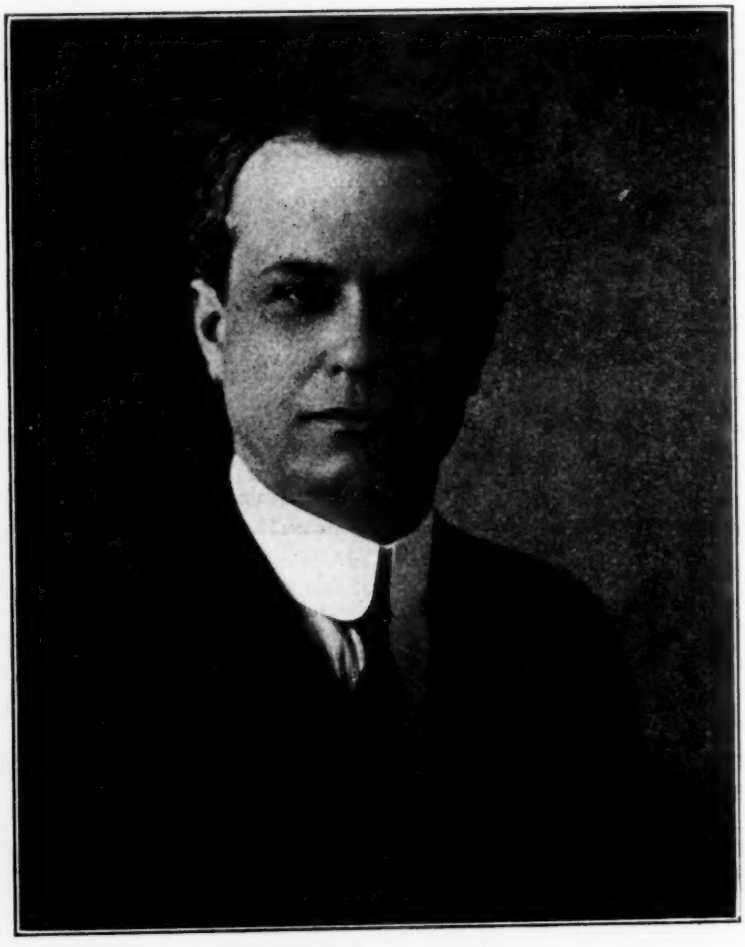

THEODORE JAMES BRADLEY

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. X JUNE 1921 NO. 6

THEODORE JAMES BRADLEY.

Theodore James Bradley was born at Albany, New York, on August 8, 1874, of English-Scotch descent, his first American ancestor, Francis Bradley, having settled in Fairfield, Connecticut, in about 1650. After receiving his preliminary education in the public schools of Albany and serving his apprenticeship in pharmacy with Louis Sautter and Alfred B. Huested of Albany, both long-time members of the American Pharmaceutical Association, young Bradley entered the Albany College of Pharmacy, from which he graduated with honors in 1895, having been registered as a pharmacist in New York State, the previous year. While teaching in the Albany College of Pharmacy, he completed a four-year course in science and graduated in 1904 from the Rensselaer Polytechnic Institute at Troy, N. Y. In 1912 he was given the honorary degree of Master of Arts by Union University.

Since graduating from the Albany College of Pharmacy, Dean Bradley has been active in educational and scientific work, frequently holding several positions at the same time, the principal ones being: chemist in the chemical laboratories of the New York State Departments of Health and Agriculture, 1895–1905; teacher in various departments and executive officer of the Albany College of Pharmacy, 1895–1912; teacher of science and mathematics in the Albany Academy, 1896–1912; teacher of chemistry in the Albany Medical College, 1897–1906; and professor of chemistry and dean of the Massachusetts College of Pharmacy, 1912 to the present time.

Since coming to Boston, Dean Bradley has been closely associated with the Board of Trustees of the Massachusetts College of Pharmacy, and the good team work done by them and the faculty has resulted in the remarkable progress made by the Massachusetts College during the last few years.

Professor Bradley has devoted a great deal of time to the work of pharmaceutical associations and is now Chairman of the Pharmaceutical Syllabus Committee, Secretary-Treasurer of the American Conference of Pharmaceutical Faculties, and a member of the Revision Committee of the United States Pharmacopoeia. He was elected third vice-president of the American Pharmaceutical Association in 1916 and successively advanced to the second and first vice-presidencies, but refused to accept a nomination for president in 1919.

During the War, Dean Bradley joined the well-organized home guard of Newton, Massachusetts, which became an efficient military organization. During the disorders resulting from the policemen's strike in Boston in 1919, he volunteered at the call of Governor Coolidge and served for about a month under strict military rule.

C. H. P.

EDITORIAL

E. G. EBERLE, Editor 253 Bourse Bldg., PHILADELPHIA

PHARMACEUTICAL EDUCATION AND DEVELOPMENT.

MERCHANDIZING has an important part in the drug business, but the continuance of pharmacy as a real service depends on its development as a profession. Many of our successful men received their education and training in the schools and laboratories of experience; some contend that this is the best way to qualify for life's work; by far the greater number will admit that schooling would have been a great help to them. The business of to-day, whether in the markets, offices, stores, manufacturing plants, or counting houses is largely conducted by men who have had at least the schooling every youth of this country may have in his home city; most of them have had more. The growing competition in the business of making a living demands that the largest possible number are qualified to do that well which they have selected for their life work. Dr. Cyrus Adler, member of the Philadelphia Board of Education, recently said in substance, "Our educational equipment must be built up to the point where we are able to achieve and find joy in the doing. A happy, reasonable, resourceful set of people is one of the best guarantees we can have of success as a Nation and as a people."

Instruction in certain fundamentals should be given in the schools; there is difference of opinion relative to what the curricula of primary and high schools should cover. It may be possible that students can make better use of their time in professional or vocational schools without neglecting cultural education and training. Year by year the number is increasing who have had high school, university or college education, and thereafter selected for life's work an activity which not many years ago included chiefly those whose years in school were few, and their application ranged low. They are the patrons of pharmacists; with them the latter must associate and transact business. The viewpoint relative to pharmaceutical education is rapidly changing because of this realization and that the obligations of pharmacists to the public can only be fulfilled by coöperation with related professions, and this is possible only when cultural and educational standards are brought into closer relationship.

During the Commencement season the interest of pharmacists centers about what educators in pharmacy impart to their students as a final message, a summary of what has been taught them—that pharmaceutical education seeks to organize knowledge and experience so as to give the students a background of wide information of a business and profession to reason from. It acquaints them with the history of pharmacy; with its developments by experiments and results; prepares them to use their judgment relative to the mission of pharmacy, and the services rendered in its pursuit. It unfolds to them the general principles which experience of predecessors, modified by time and environments, has set up as standards and guides; supplies them the foundation for the business of living, for the conduct of pharmacy and the drug business.

The application by the graduates in pharmacy when they enter upon the practice of their profession will differ as the individuals and the environments of

their chosen respective locations; the important thing in their education is that they are led to think, to think through, to analyze, and to apply. The subjects in a pharmacy school are primarily vocational, but they contribute to a broad and liberal education which develops an understanding and makes the hand and brain work easier whether business or professional application is made, even though not in the drug business. It is for this reason that pharmacists are not infrequently eminently successful in other activities—their pharmaceutical education has qualified them to engage in other pursuits. Pharmacy and pharmacists have contributed largely to the development of many industries, and to applied chemistry; the search for drugs has in all ages had much to do with the development of commerce, and the investigations of them with art and science.

Scholars and statesmen have said that the fate of a country depends upon the education of the people; that its prosperity consists in the number of its cultivated citizens, in its men of education, enlightenment and character; by deduction—the fate of pharmacy depends upon the education of pharmacists; its usefulness and service are exemplified by the number of its cultured votaries, in its men of education, enlightenment and character.

Pharmacy is entering one of its most important epochs. There are many problems to be studied, difficult because of the interrelations of pharmacy. Improvements are to be made, and much that is more or less intangible now must be more definitely fixed. Pharmacy has been formative and progressive—it will probably always be more or less complex—but recent developments indicate that coördinated, coöperative endeavor will energize and characterize it.

E. G. E.

THE INCERTITUDE OF LAW AND PHARMACISTS' INTEREST IN LEGISLATION.

A test case brought up to the Texas Court of Criminal Appeals by an optometrist was decided against the appellant, who was fined and sentenced to imprisonment, having been convicted of violating the Texas Medical Practice Act.

For a number of years past efforts have been made by the optometrists of Texas to pass a law recognizing optometry as a profession; the proposed measures have been defeated and, if we are rightly informed, the object of this court transaction was to impress the public and the Legislature with the importance of the desired enactment.

The only appeal from the decision of the Court is to the Legislature and the people. A condition has been brought about which gives one needing glasses his choice of being fitted by a doctor who has made a study of optometry or by one who has not. Optometrists, after recommendation has been made by a licensed physician, may fit glasses, but the opinion holds that when they do so without such endorsement they violate the Medical Practice Act; the business of hundreds has been injured.

It is admitted that the need of glasses comes from a "disorder or physical deformity," but these are not the largest causes. It is reasonable to assume that one who has made a study of refraction and qualified as an optometrist will not risk

his reputation by fitting glasses for correcting vision when he is aware that his patron needs to consult a physician or surgeon.

The only reason for presenting this decision in these columns is thereby to direct attention to proposed measures, enactments and decisions which may in a somewhat similar way affect the drug business and pharmacy; members of legislative committees know the dangers of adverse legislation and also of that which seeks to grant special favors or privileges. Laws applying to pharmacy should protect the people and give them better service.

President Harding is said to favor a federal department of Public Health; pharmacy as a branch of medicine should receive due consideration in the measure which will provide for its establishment.

E. G. E.

THE MEMBERSHIP OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

BY WM. B. DAY.

In view of the statements that have been made from time to time concerning the growth or lack of growth in membership of the American Pharmaceutical Association, it seems worth while to present in tabular form a comparison of the membership of the Association during the past seven years, the period during which the writer has occupied the offices of General Secretary and Chairman of the Membership Committee. With the assistance of Mr. Wm. Mittelbach, who for a number of years was Chairman of the Membership Committee and who is deeply interested in the growth of the Association, the following tabulations* of the membership by states and cities have been prepared.

The comparison of the total membership year by year beginning with 1914 is of interest inasmuch as it reveals the fact that the total increase in membership in these seven years amounts to 1096 members, or 46 percent. Explanatory of these figures, attention should be called to the fact that during the seven years, from 1914 to the present time, 3430 new members were added—enough to have more than doubled the membership. The resulting gain of only 1096 means that in seven years 2334 members have been lost through suspension, resignation or death. While an average annual increase of six percent is rather small, there is encouragement in the fact that during the last two years the average increase has been 15% and 11%, respectively.

As might be expected, the states having the largest population have as a rule the largest membership, but even here there are other factors to be considered. Density of population is a favorable factor; for example, Ohio, with about 20% larger population than Texas, has more than twice as many A. Ph. A. members. Massachusetts has 40% more members than Michigan and double the number of members California has, while the three states rank close together in population. New Jersey, with a population 10% less than Missouri, has 25% larger membership in the A. Ph. A. Energetic membership campaigns exert great influence, thus Virginia

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* These figures were compiled from the geographical lists of members published in the Year Book, Vols. 1–7 and the manuscript for Vol. 8 now in press.

and Tennessee, with an equal population, are very disproportionate in their A. Ph. A. membership, Virginia having nearly four times as many members as Tennessee; Minnesota has nearly five times as many members as Kentucky though of nearly the same population. In great measure, large cities mean proportionately more A. Ph. A. members, yet Table No. 2 shows that other factors are to be considered. Thus, Detroit, with a population about 20% larger than Boston, has more than twice as many A. Ph. A. members—a situation for which the large pharmaceutical industries in Detroit are in part responsible. Minneapolis, with a population considerably less than that of Milwaukee, has two and one-halft imes as large an A. Ph. A. membership. Havana, Cuba, makes an excellent showing with twenty-four A. Ph. A. members—twice as many as Omaha.

The selection of the city for the annual convention usually means a stimulus to membership. The growth of the A. Ph. A. membership in New Orleans during the past year, since announcement was made of the Crescent City for the meeting place, has been almost phenomenal, due, in large part, to the enterprise and activity of the local membership committee. The stimulus afforded the California membership by the San Francisco meeting of 1915 is another instance.

Active and successful local branches not only build up but *hold* the membership, as is well shown by the growth in membership in the cities of New York, Philadelphia and Chicago. The failure of the Wilkes-Barre Branch is indicated by the loss of more than half the members in that city during the past year. The energetic membership campaign carried on by the Virginia Branch has resulted in the high rank attained by that state and its capital, Richmond. Northwestern Branch has doubled the membership in the "Twin Cities."

While tabulation No. 1 shows that membership in many of the states has been stationary or nearly so and in a few instances has even decreased, in a number of states the membership has doubled, tripled or even quadrupled—in North Dakota nearly sextupled—during the past seven years—and the result as a whole cannot be called unsatisfactory. Our rate of growth has been notably accelerated since 1919, and, having acquired this momentum, a little more effort and a little better co-operation on the part of our members should soon place the Association in the position that it must rightfully hold as a national body.

At the present rate of growth, we will pass the 5000 mark within the next four years. It should be the effort of every member to bring this about, bearing in mind that it is not less important to hold the members already enrolled than to add new members to our organization.

TABLE 1.—MEMBERSHIP BY STATES.

	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.
Alabama	15	17	17	17	23	21	19	42
Arizona	0	1	4	1	0	0	1	1
Arkansas	21	26	24	16	15	17	30	32
Alaska	2	2	3	3	3	4	3	2
California	90	82	94	102	94	75	74	73
Colorado	68	58	58	51	48	43	40	41
Columbia, District of	34	34	34	35	33	34	39	39
Connecticut	19	18	18	30	30	26	28	26
Delaware	3	6	7	7	8	5	4	3
Florida	19	20	21	22	23	27	33	25

Georgia	13	20	16	18	15	12	17	18
Hawaiian Islands	2	1	1	1	1	1	1	1
Idaho	8	5	6	8	6	5	5	9
Illinois	180	177	179	185	202	252	264	383
Indiana	70	77	78	97	114	101	99	94
Iowa	46	50	56	53	44	45	45	68
Kansas	25	24	25	28	26	19	24	40
Kentucky	34	44	39	32	30	29	31	36
Louisiana	24	26	26	33	31	34	44	78
Maine	26	24	28	33	32	23	24	24
Maryland	73	75	73	75	72	65	66	70
Massachusetts	134	141	140	138	135	120	136	142
Michigan	57	119	106	106	99	103	108	109
Minnesota	43	45	47	55	50	97	138	174
Mississippi	9	8	9	15	17	14	15	18
Missouri	110	130	117	160	98	93	121	128
Montana	10	16	17	19	19	18	24	30
Nebraska	40	35	42	41	35	32	29	33
Nevada	1	2	2	2	3	3	2	2
New Hampshire	6	7	6	7	6	6	7	7
New Jersey	73	92	90	107	98	105	130	137
New Mexico	6	4	6	5	4	4	3	3
New York	228	268	299	364	382	385	420	421
North Carolina	15	18	17	25	26	22	32	31
North Dakota	9	8	8	12	20	24	44	50
Ohio	119	136	137	139	136	122	146	157
Oklahoma	13	13	15	14	16	13	21	22
Oregon	22	19	18	20	18	17	15	18
Pennsylvania	228	233	229	242	239	318	351	358
Philippine Islands	67	30	6	5	5	2	4	3
Porto Rico	2	2	2	1	2	4	5	5
Rhode Island	22	19	16	16	15	13	18	15
South Carolina	3	4	5	6	6	9	24	28
South Dakota	23	24	26	24	27	23	36	35
Tennessee	71	59	49	38	40	31	36	31
Texas	61	63	60	71	68	68	76	66
Utah	9	10	8	9	7	6	6	8
Vermont	17	16	15	16	11	14	14	10
Virginia	29	30	32	25	24	37	86	114
Washington	40	35	38	37	30	24	39	41
West Virginia	13	27	26	21	22	18	16	15
Wisconsin	38	37	37	37	41	39	36	41
Wyoming	5	2	2	0	0	2	2	4
Dominion of Canada	13	18	17	17	19	20	18	18
Cuba	32	26	29	37	35	31	40	41
In Foreign Lands	14	14	10	20	18	15	24	30
TOTALS	2354	2497	2490	2698	2621	2690	3113	3450

TABLE 2.—MEMBERSHIP IN THIRTY-FIVE CITIES.

	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.
Los Angeles	13	8	9	11	12	10	13	11
San Francisco	36	34	35	36	31	24	20	23
Denver	34	34	33	33	30	28	29	29
Washington	34	34	34	35	35	34	39	39
Indianapolis	28	28	31	57	66	58	50	44

Louisville	15	19	17	12	12	12	14	15
New Orleans	21	20	19	23	20	29	32	56
Chicago	119	117	119	119	130	174	176	272
St. Louis	74	92	82	69	69	63	88	95
Kansas City	11	13	11	10	9	10	11	12
Baltimore	53	56	56	60	58	52	53	57
Boston	39	45	45	42	40	37	34	31
Detroit	35	87	77	79	72	72	74	78
Minneapolis	20	19	20	20	20	29	31	39
St. Paul	13	15	15	16	15	16	17	24
Omaha	12	11	15	14	13	11	12	12
Newark	13	14	15	19	15	17	22	21
Buffalo	15	16	16	15	19	17	15	14
Brooklyn	41	43	46	48	51	61	70	65
New York	106	130	153	205	220	221	249	244
Cincinnati	38	36	38	43	42	37	43	41
Cleveland	23	31	35	37	36	34	50	60
Columbus	22	32	29	21	20	17	17	15
Portland (Ore.)	11	9	8	8	7	9	8	8
Philadelphia	112	120	121	129	128	141	159	171
Pittsburgh	34	30	30	30	32	31	34	32
Wilkes-Barre	....	....	....	....	....	33	35	18
Manila	32	15	3	3	3	2	3	3
Providence	14	14	12	11	11	9	10	9
Nashville	38	28	22	14	13	11	15	10
Dallas	10	11	6	12	15	18	15	8
Richmond	9	10	9	11	11	15	28	42
Seattle	16	17	18	17	14	11	24	23
Milwaukee	14	16	14	16	20	16	13	15
Havana	....	....	21	27	24	20	25	24
35 Cities	1105	1204	1214	1302	1313	1379	1528	1660

PHYTOCHEMICAL NOTES.*

No. 87. Methoxyl Determinations of Monarda Oils.

BY D. C. L. SHERK.‡

The investigation of the methoxyl constituents of Monarda oils was undertaken in the hope that this additional constant for the oil would be useful and characteristic, and that, moreover, it might prove an aid in the identification and isolation of new constituents.

Ethers of the hydroxy derivatives of cymene are known to exist in a few oils. The dimethyl ether of hydrothymoquinone constitutes the bulk of arnica root oil,[1,2] and ayapana oil[3] and the oil of *Eupatorium capillifolium*.[4] The methyl ether of thymol occurs in "Samphire oil"[5] and Pickles[6] claims to have isolated a monomethyl ether of hydrothymoquinone from *Cyprus origanum* oil which consists principally of carvacrol.

Accordingly Zeisel's method for the determination of the methoxyl value was applied to the oils. The apparatus was essentially that designed by Zeisel[7] and the procedure was practically the same; except that the gas carrying the vapors of alkyl halide was washed by passing through an alkaline solution of

* From the laboratory of Edward Kremers.

‡ Fritzsche Brothers Fellow, 1919–1920.

arsenous oxide, as recommended by Gregor,[8] and the halide was absorbed in an absolute alcoholic solution of silver nitrate slightly acidified with nitric acid, also suggested by Gregor. For each run a quantity of silver nitrate was weighed out and for standardizing the apparatus similar quantities were weighed out and factors determined. At the end of each run the alcoholic silver nitrate solution was diluted with about four volumes of water and the silver remaining in solution titrated by Volhard's method. Determinations were run uniformly for three to four hours and in certain cases where tars were analyzed the procedure was modified to the extent that acetic anhydride was added to keep the tar in solution and prevent the formation of an impenetrable resin.

The samples of oils that were tested represent the accumulation of several years in the laboratory and are presented in the order of the most recent ones first, beginning with the 1919 crop. Of *Monarda punctata* there are three samples along with their cohobated portions. Of earlier oils mostly the non-phenol residue was available. Of *Monarda fistulosa* besides the crop of 1919 with the cohobated oils there were also some other original oils and fractions available for a number of years back.

Monarda Punctata.

Description of oil	—OCH_3 p. c.
1919 Florida variety. Original oil	0.36
2nd and 3rd cohobation	0.32
Highlands sample. Original oil	0.05
1st cohobation	0.12
1919 Lone Rock. Original oil	0.17
	0.16
2nd and 3rd cohobation	0.26
1918 8–25—Chiefly leaves and stems	0.11
	0.18
From ripe and long dried flower heads	0.23
	0.21
1917 Mature flower heads, non-phenol	0.42
	0.47
Princeton, non-phenol	0.12
Non-phenol	0.40
1916 8–2—Randall	0.08
E. R. M. cohobation	0.11
1913 Alabama E. R. M.	0.33

By way of check, methoxy determinations were made on vanillin, yielding 20.17 p. c., 20.70 p. c. and 20.46 p. c., respectively. Hence the average is 20.44 p. c., whereas the theory calls for 20.4 p. c.

Monarda Fistulosa.

Description of oil.	—OCH_3 p. c.
1919 Cleaned material. Original oil	0.26
	0.28
Non-phenol	0.29
2nd cohobation	0.11
3rd and 4th cohobation	0.60
	0.70
Loose material. 2nd cohobation	0.10
3rd and 4th cohobation	0.58
1918 8–18—Plants mature	0.30
	0.29
Long dried and ripe flower heads	0.44
	0.40
1918 8–23 and 24—Plants over-mature	0.43
1915–1916 By cohobation, E. R. M. "non-phenol"	0.45
Same truly non-phenol	0.54
1916 Sample of 1915 oil	0.08
1913 8– 7—Original oil	0.15
8– 7—Non-phenol	0.14
8– 7—Cohobated oil F. and T.	0.12
7–25—Crop 1913	0.26
7–30—N. W. (1)	0.14
8– 7—N. W. (2)	0.16
7–30—Camp Randall, F.	0.13
1912	0.32
	0.37
"Mo."	0.39
	0.47
1911 7–6—Madison (Light stems)	0.28
1910 Variety b Light stems	0.38
Variety b Purple stems	0.18
	0.16
Variety b "Mo."	0.60
	0.51

These results indicate that substances containing methoxyl groups are regular constituents of Monarda oils. The examination of *M. fistulosa* oils shows a uniformity of distribution of these constituents between the original and non-phenol portions of the oil. The 1919 sample and the 1915–16 sample seem to point to the fact that a close parallel exists because both of these oils contained about 62 percent phenols and had been treated in the same manner.

The methoxyl derivatives of cymene known to be constituents of volatile oils are thymol methyl ether and hydrothymoquinone dimethyl ether. Both of these have no phenolic properties and would, according to theoretical behavior, not be separated in the process of extraction but would be concentrated. Hence the removal of 60 percent of the oil as phenols should result in an increase of the methoxyl value in the first case of from 0.27 to about 0.68 and in the second case from 0.45 to 1.13 in the non-phenol residual portion; whereas in the first case the increase was within the error of experiment and in the second to only 0.54. Such a concentration of methoxyl represents the following concentration of original constituent calculated on the basis of the monophenolic and diphenolic ethers:

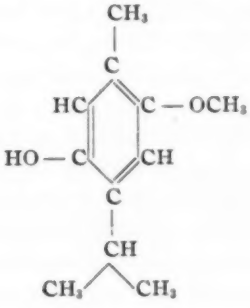
0.27 p. c. OCH_3 = 1.43 p. c. thymol methyl ether
0.45 p. c. OCH_3 = 2.38 p. c. thymol methyl ether
0.27 p. c. OCH_3 = 0.84 p. c. hydrothymoquinone dimethyl ether
0.45 p. c. OCH_3 = 1.41 p. c. hydrothymoquinone dimethyl ether

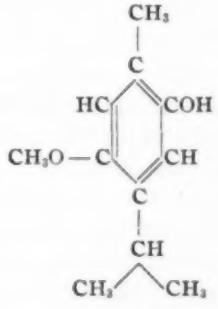
The presence of a methoxyl constituent which separates with the phenol and has phenolic properties has been suggested by Pickles as a monomethyl ether of hydrothymoquinone and the behavior of these fractions also indicates the presence of such a constituent. On the basis of this compound these results are obtained:

0.27 p. c. OCH_3 = 1.58 p. c. hydrothymoquinone monomethyl ether
0.45 p. c. OCH_3 = 2.61 p. c. hydrothymoquinone monomethyl ether

Having thus indicated the presence of such a substance an attempt was made to isolate it by following the scheme outlined by Pickles, and also by working up some phenol residues of *M. punctata* oil from which as much crystalline thymol as possible had been removed.

Pickles[6] obtained two phenols from Cyprus Origanum oil, the chief of which is carvacrol. This was extracted completely from aqueous alkaline solution by shaking with ether. Acidification then yielded a small quantity of another phenol of which only 0.4 Gm. was obtained. Analysis corresponded to the formula $C_{11}H_{16}O_2$ and he thought it to be a hydroxymethoxy cymene. This would probably identify it with one of the two isomeric monomethyl ethers of hydrothymoquinone:





Semmler[3] obtained what was probably a mixture of these two isomers by heating the dimethyl ether with hydriodic acid and red phosphorus in a closed tube to 90°. Its composition corresponded to that formula.

Two kilos of oil of *Monarda fistulosa* were extracted in portions with five percent sodium hydroxide. After separation of the alkali solution it was shaken with about an equal volume of ether three times and the extraction of the oil was repeated, using this same alkali solution. In this manner a minimum of alkali was required and it was hoped that a separation and concentration of the phenol constituents of the oil might be effected. The carvacrol, recovered from the extract by distilling off the ether, was distilled in a current of superheated steam at 180° and the distillate was found at the last to yield crystals of hydrothymoquinone, indicating that the dihydroxy phenols may be extracted by ether from their solution in sodium hydroxide of this concentration.

Acidification of the alkaline liquors gave an oil which was recovered by extracting the solution with ether and the ether recovered on the water-bath. The recovered oil was treated with excess of barium carbonate and water and boiled under a reflux to remove acid. The tar separated with the salt. The aqueous solution was drawn off and the tarry residue extracted with alcohol, the alcoholic solution filtered, the alcohol evaporated, and the residue fractionated at 3 mm. This yielded a pale reddish oil which deposited red and yellowish crystals. The amount was slight. The distillate was analyzed as follows:

	Methoxy (OCH_3).
I	1.09 p. c.
II	1.21 p. c.
III	1.12 p. c.
Average,	1.14 p. c.

The tar remaining was analyzed also:

	Methoxy.
I	1.17 p. c. (in acetic anhydride)
II	0.95 p. c. (in acetic anhydride)

The oil itself gave a methoxyl value of 0.27 for the original and 0.29 for the non-phenol portion.

This proves first that the other phenolic constituents of the oil divide themselves in this extract in much the same manner as in the original, and that the dihydroxy phenol is removed by ether along with carvacrol. A different concentration of alkali might yield a product in which a better separation has been effected. Also, there is only a very slight concentration of the methoxyl constituents by this process. However, this separation should be undertaken on other samples of oils to ascertain the conditions under which a better concentration and separation may be obtained.

The Residual Phenol Oil of M. Punctata.—Another method of concentration of the methoxyl constituents of Monarda oils was available. From previous lots of oil from *M. punctata* which had been used for large scale production of thymol, a quantity of phenol oil remained which no longer yielded thymol by freezing. This non-crystalline portion was of a dark brown or nearly black color and rather viscous. The total quantity represented a small percentage of the

original phenols and it was analyzed for methoxyl value, yielding 1.06 p. c. and 1.02 p. c., respectively, in two determinations.

This oil was then subjected to further treatment in which it was first fractionated at reduced pressure, whereupon a mobile distillate and a black, brittle tar remained. The first fractionation was made at 36 mm. up to 180° and was divided as follows:

Temperature.	Yield.
Up to 135°	...
135–140°	140 Gm.
140–145°	206 Gm.
145–160°	222 Gm.
160–180°	134 Gm.
Total,	702 Gm.

The second fractionation was made at 18 mm. and of the above oil 636 Gm. were recovered. Other similar fractions were added and there were obtained about 1.5 kg. all of which was fractionated at 19 mm. and resolved for the largest part into a single fraction with a slight "Vorlauf" and a very high boiling residue distilling off at 2 to 3 mm.

Fraction.	Pressure.	Quantity.	Methoxy.
Up to 120°	19 mm.	....	....
120 to 125°	19 mm.	1062 Gm.	0.21 p. c.
125 to 135°	19 mm.	110 Gm.	0.38 p. c.
135° and up	19 mm.	140 Gm.	0.55 p. c.

The distillate obtained by fractionation at 2.5 to 3.5 mm. was very viscous and of a brownish color with a slight fluorescence. As the thymol obtained originally from the oil was purified from petroleum ether, the residual petroleum hydrocarbons may be responsible for this fluorescence. The viscous distillate gradually solidified and dilution with heptane up to three volumes resulted in the deposition of crystals in large quantity easily proven to be hydrothymoquinone. These fractions have the smoky odor characteristic of the higher polyhydroxy phenols.

These results seem to indicate that here, too, there is only a very slight difference in concentration of methoxyl constituents by this process. In fact, all of the fractions contained less than the original oil and there appears to be an actual loss. Examination of the tar remaining did not account for this loss.

Monarda Tar.—In practically every operation upon Monarda oils a black, brittle tar is obtained which resists almost all attempts to resolve it into its constituents or to obtain crystalline derivatives. This may represent the quinhydrones which are capable of forming in the oil and to which the red color of the oil is attributed, and also the black color of the tar.

Nitric acid of specific gravity 1.2 reacts vigorously with the tar and on long-continued boiling oxidizes it almost completely. Chromic acid mixture also reacts vigorously on warming to the boiling point. Neither yielded anything that looked hopeful as a means of identifying constituents of the original tar.

Along with other portions of Monarda oils the methoxyl value was determined on this tar also. A brittle tar, representing the residue of an oil after fractionation of the non-crystalline phenols at 36 mm. up to 180°, gave the follow-

ing methoxyl values, using also a modified method with acetic anhydride as a solvent for comparison.

Tar.	Methoxy.
I	1.48 p. c. direct
II	0.62 p. c. direct
III	0.61 p. c. direct
IV	0.68 p. c. acetic anhydride

A fraction of oil distilled from these residues which deposited crystals of hydrothymoquinone was analyzed, giving 0.82 p. c. methoxyl.

When carvacrol from Monarda oil was extracted from alkaline solution by means of ether, the alkaline solution on acidification gave a phenol mixture which was distilled at 2 to 3 mm. and in this case also a tar resulted which was hard and friable. This was analyzed, using acetic anhydride as a solvent, giving 1.17 p. c. and 0.95 p. c., respectively, as the results of two determinations.

The most promising method of investigation seemed to be by fractionation of the tar at as low temperatures as possible. The tar itself had previously been fractionated at 35 mm. up to a temperature of 180° when decomposition had begun to take place. These residues were accordingly fractionated at as low a pressure as possible.

The following data were obtained on two runs:

I. 279 grammes of tar were taken.

Time.	Temperature.	Pressure.	Wt. of distillate.
3:45	118°	15 mm.	...
4:12	124°	15 mm.	...
4:16	124°	14 mm.	115 Gm.
4:30	134°	16 mm.	31 Gm.
4:37	144°	16 mm.	12 Gm.
		Total,	158 Gm.

II. 160 grammes tar were added and again fractionated.

3:13	120°	17 mm.	11 Gm.
3:20	124°	18 mm.	..
3:28	126°	18 mm.	..
3:34	133°	18 mm.	50 Gm.
3:40	144°	18 mm.	29 Gm.
		Total,	90 Gm.

Of 440 Gm., 250 Gm. were recovered at 18 mm. Distillation was continued at 3 mm. with the aid of a mechanical pump.

Temperature.	Pressure.	Wt. of distillate.	Temperature.	Pressure.	Wt. of distillate.
101°	3.0 mm.	..	144°	3 mm.	34 Gm.
102°	3.5 mm.	..	158°	3 mm.	..
113°	3.5 mm.	..	168°	3 mm.	..
116°	3.5 mm.	84 Gm.	184°	3 mm.	25 Gm.
131°	2.5 mm.	..			

The portion (34 Gm.) gradually solidified spontaneously and was easily proved to consist principally of hydrothymoquinone, melting at 141° after crystallization from hot water. The last fraction was exceedingly viscous. All three deposited crystals when diluted with heptane up to three volumes. Beyond

that a tarry layer began to separate. Thus about one-third of the tar consists of hydrothymoquinone which can be separated by fractionation and, if necessary, by precipitation with heptane.

This result suggested the possibility of obtaining derivatives of hydrothymoquinone directly from the tar, a thing that had not been previously accomplished.

2.5 Gm. tar were treated with 4.0 Gm. phenyl isocyanate in 20 Cc. solvent* and boiled for 35 minutes at this time. The contents became granular and apparently crystalline after standing for ten days. The flask was reheated. This product was taken up in alcohol, after separation from petroleum, and an oil obtained which deposited some crystals on standing. The alcoholic solution was evaporated and dirt removed as well as possible. The product melted at 237 to 238° and gave the same result after an attempted recrystallization from alcohol. It was by no means colorless yet. An analysis by Dumas' method gave this result:

0.1313 Gm. gave 15.2 Cc. N_2 at 23° and 709 mm., or 12.55 p. c., whereas hydrothymoquinone diphenylurethane contains but 6.93 p. c. The amount of material was too small for further study.

The separation of hydrothymoquinone in quantity from the mother liquid of thymol obtained from *Monarda punctata* on a large scale supports the view that the tar consists in no small part of phenoquinones or quinhydrones, or both. Its isolation in the manner described above suggests the further study of these tar residues for the ketones with which the phenols from the quinhydrones or phenoquinones are assumed to be combined.

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THE CAPSICUM MONOGRAPH IN U. S. P. X.

BY E. N. GATHERCOAL AND R. E. TERRY.

The revision of the monograph of Capsicum hinges largely on the desirability of excluding all commercial forms of Cayenne pepper except true African chillies.

That African chillies are the most pungent is generally conceded. J. M. Francis states that the degree of pungency is approximately as follows: Mombassa chillies 50,000 to 100,000, Zanzibar chillies 40,000 to 50,000, Japanese chillies 20,000 to 30,000. Pungency is apparently the only pharmacologic property desired of capsicum as a medicine, hence it is desirable that medicinal capsicum be of the highest pungency and fairly uniform in this property.

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* Petroleum boiling at 180–200°.

The imports in pounds of Capsicum, Red Pepper, Cayenne Pepper (these names being used synonymously in commerce) for 1918–19 were as follows:[1]

Commercial trade name.	Imported from.	1918.	1919.
PAPRIKA	Spain	1,469,008	1,826,288
	Italy	.....	51,630
MEXICAN CHILLIES	Mexico	73,329	20,463
	Nicaragua	.....	311
	Cuba	.....	862
EAST INDIA CHILLIES	Dutch East Indies	43,000	708
	British Indies	.....	11,200
JAPANESE CHILLIES	Japan	697,848	399,007
SIERRE LEONE CAPSICUM	British West Africa	.....	4,480
MOMBASSA (Zanzibar) CAPSICUM.	British East Africa	366,370	111,999
Mostly African Capsicums...	British South Africa	420,465	9,500
	England	4,489	212,280
	Chile	78,484	38,152
	Aden	.....	22,400
	Hong Kong	2,500	400
	Canada	76,748	11,936
	Netherlands	.....	198
		3,232,241	2,721,814

In 1920 heavy imports[2] of paprika from Spain, chillies from Japan, and capsicums from Italy, British East Indies, Dutch East Indies and England are noted in the trade journals. Also a shipment of paprika through Holland. In January and February of 1921, imports of paprika from Trieste are noted, and of chillies from British East India.

From the official records it would appear that world commerce should be able to supply genuine African chillies to meet the needs of the United States, for medical purposes.

To insure the exclusion of all but African chillies from the monograph of Capsicum there appear to be five points in the present monograph to be considered, namely:

I. The common names.

II. The botanical name in the definition.

III. The number of seeds in the fruit and possibly other points of physical appearance.

IV. The microscopical distinctions between the various capsicums in powdered form.

V. The tests.

I. Regarding the synonym "Cayenne Pepper," Dr. H. Engelhardt's criticism that this term is used in the spice trade as the name for the less pungent capsicums, and therefore should be dropped from the U. S. P., is well taken.

II. The botanical name "Capsicum frutescens" is generally applied to any woody or shrubby capsicum plants, and the East Indian and Japanese capsicums are produced on shrubby plants, as well as the true African capsicums. The

[1] "Foreign Commerce & Navigation of the United States," 1919.

[2] *Drug and Chemical Markets.*

criticism of Dr. H. H. Rusby that the more specific name "minimum" or "fastigiatum" should be used is approved by us, "fastigiatum" preferred.

III. The criticism of Dr. Engelhardt that the maximum number of seeds, 17, should be increased to 20, has been noted. An examination of several commercial capsicums resulted as follows:

Zanzibar (1910).	Sierre Leone (1920).	Japan (1920).	Bombay (1921).
8	12	23	24
14	21!	29	24
15	14	13	9
17	15	29	24
19!	16	22	15
11	15	24	19
10	13	20	15
10	11	22	10
12	11	20	19
12	13	29	19
12	9	22	48
..	17	49	28
..	..	..	47
..	..	..	29
..	..	..	29
..	..	..	29
..	..	..	18

IV. That it would be very desirable to present certain distinctive histological features by which African chillies in powdered form could be distinguished from other capsicums is self-evident. We believe this can be done in connection with the outer epidermis of the pericarp.

V. Dr. Engelhardt's criticism to the effect that samples of African chillies now in the market will not comply with the present 2 percent purity rubric has been borne out by our own experience, notably with one lot, apparently Sierre Leone Capsicum, which contains 5% of stems, calyxes and other organic foreign matter. However, we question whether the tolerance should be increased or, if at all, but very slightly. Clean African capsicum has been obtainable in the past, and should be again.

The ash limit of 7 percent and 1 percent of acid-insoluble ash has not been questioned. It might be advisable to reduce the total ash limit to 6.5 percent and thus make it correspond with the U. S. Dept. of Agriculture ruling. E. L. Patch found total ash of 12 samples 5.2 to 10 percent; above 7 percent, 6 samples; below 7 percent 5 samples.

Some recent work is submitted herewith.

Kind.	Source.	Condition.	Total ash.	Acid insol.
PAPRIKAS				
1. Hungarian.	Grown in Indiana	Powdered	5.7 5.65–5.675	
2. Hungarian.	Imported Rosen paprika	Powdered	4.94 4.82–4.88	
CHILLIES				
4. Japanese...	.....	Powdered	5.5 5.31–5.405	
7. Japanese...	Nyassa	Whole	5.47 5.55–5.51	

8.	Madras....	.....	Whole	5.29 5.23–5.26	
9.	Madras....	"Cherries"	Whole	4.57 4.55–4.56	
CAPSICUMS.					
10.	East Indian	Lehn & Fink	Whole	4.5 4.3 –4.4	
3.	East Indian	Squibb	Powdered	4.89 4.87–4.88	
5.	Japanese...	Kobe	Whole	4.87 4.81–4.84	
14.	Japanese...	Fuller-Morrison	Whole	4.75 4.55–4.65	
15.	Japanese...	Lehn & Fink	Whole	5.416 5.468–5.442	0.57%
16.	Japanese...	Fuller-Morrison	Whole	5.02 4.53–4.775	
17.	Japanese...	Fuller-Morrison	Powdered	7.64 7.65–7.654	1.12%
11.	African....	Sierre Leone	Whole	4.54 4.43–4.485	
12.	African....	Zanzibar	Whole	4.8 4.65–4.725	
13.	African....	Mombassa	Powdered	7.998 8.426–8.212	1.59%

A moisture limit of 7 percent might well be established. E. L. Newcomb found 4.50 percent, 4.10 percent, 5.80 percent. We have found 7.1 percent, 6.9 percent, 5.4 percent.[1]

The non-volatile ether extract minimum of 15 percent has been criticized by Dr. A. R. L. Dohme and by W. H. Blome, with the suggestion that it be lowered to 12 percent. If this requirement is designed to exclude capsicums adulterated with foreign material, lacking in ether-soluble constituents, it is all right, but if it is designed to exclude commercial capsicums of inferior pungency, it fails, for Japanese and Indian capsicums of inferior pungency yield, as a rule, higher ether extractives than does African capsicum. As 15 percent is also the standard adopted by the Bureau of Chemistry, U. S. Department of Agriculture, we should dislike to see this standard lowered without a more extended investigation. Our results upon eight samples of known origin are as follows:

2.	Paprika	Rosen paprika	28.53%
7.	Chillies	Japanese, large	20.45%
3.	Capsicum	East Indian, Squibb	20.90%
10.	Capsicum	East Indian	20.35%
17.	Capsicum	Japanese, F. M. & Co	18.50%
12.	Capsicum	African, A. W. & Co., 1912	16.45%
13.	Capsicum	African, L. & F., 1910	17.00%
11.	Capsicum	African, L. & F., 1920	20.40%

W. H. Blome reports 19.5 percent of ether-soluble, non-volatile extractive from one sample of capsicum recently examined; George E. Ewe reports 14.44

[1] Dried at 102° C. for 24 hours.

percent lowest and 15.08 percent highest of four samples of capsicum examined in 1919; Tolman and Mitchell (U. S. Department of Agriculture, *Bulletin* 163) found as follows:

African capsicum...	(26 samples)	minimum 14.73%,	maximum 19.36%
Japanese capsicum..	(17 samples)	minimum 17.10%,	maximum 23.21%
Hungarian paprika..	(7 samples)	minimum 12.21%,	maximum 16.43%

Frank M. Boyles (*Jour. Ind. & Eng. Chem.*, vol. 9, p. 301) presents the following data:

		Total ash		
Capsicum.	No. of samples.	Max.	Min.	Aver.
So. Carolina	17	7.75	4.82	5.98
Bombay	35	9.35	5.56	6.95
Japanese	19	6.84	4.90	6.05
Mombassa	7	9.40	4.36	6.08
Korean	4	7.70	6.20	
Niger	3	6.17	4.27	

Acid Insoluble Ash, in nearly every instance, ran less than 1%, the maximum being 1.77.

		Non-volatile ether extracts.		
Capsicum.	No. of samples.	Max.	Min.	Aver.
So. Carolina	17	15.70	10.75	13.92
Bombay	35	20.40	12.34	16.47
Japanese	5	17.03	12.80	15.56
Mombassa	7	25.49	15.75	20.16
Korean	2	22.25	19.77	
Niger	3	21.96	15.60	

The Scoville organoleptic test has been suggested for incorpora ion into the Capsicum Monograph. The wording, based on J. M. Francis' statement, might be as follows:

Mix well 1.0 Gm. of powdered Capsicum in 50 Cc. of alcohol, in a stoppered flask, and macerate for 24 hours; dilute 0.1 Cc. of the clear, supernatant liquid with 140 Cc. of distilled water containing 10 percent of sugar; 5 Cc. of this dilution swallowed at once will produce a distinct sensation of pungency and taste of capsicum in the mouth and throat.

An endeavor has been made also to provide a pungent substance of known composition as a standard against which the capsicum could be compared. We have found that pure capsaicin in a dilution of one part in 10,000,000 imparts a pungency equal to the pungency of African capsicum one part in 75,000. As capsaicin is not readily available, piperine might be used as a standard. One part of piperine to 100,000 about equals African capsicum one part in 75,000. Such a test could be worded as follows:

Mix well 1.0 Gm. of powdered Capsicum in 50.0 Cc. of alcohol in a stoppered flask and macerate for 24 hours; dilute 1.0 Cc. of the clear supernatant liquid with 249.0 Cc. of distilled water; one Cc. of this dilution added to 4 Cc. of water containing 12 percent of sugar and swallowed at once will produce a degree of pungency in the mouth and throat not less than the pungency produced by swallowing 5 Cc. of a dilution of one Cc. of a 1 in 100,000 alcoholic solution of capsaicin to 99 Cc. of distilled water containing 10 percent of sugar.

The great objections to these tests are two, *viz.*, the great differences in taste sensibility among individuals, and the fact that taste sensibility is rapidly blunted in most individuals by repeated demands upon it.

The following data are submitted in connection with the taste tests of capsicum

Sample.	Material.	Dilution.	Pungency.
1.	Paprika.....	1–25,000	distinct
	Paprika.....	1–50,000	very slight
8.	Capsicum, East Indies..	1–50,000	plainly perceptible
3.	Capsicum, East Indies[1]..	1–75,000	very decided
15.	Capsicum, Japanese.....	1–50,000	plainly perceptible
16.	Capsicum, Japanese.....	1–50,000	plainly perceptible
11.	Capsicum, West African.	1–50,000	hot
	Capsicum, West African.	1–75,000	decided
12.	Capsicum, Zanzibar.....	1–75,000	decided
13.	Capsicum, Mombassa...	1–75,000	decided
	Piperine, Merck.....	1–50,000	hot
	Piperine, Merck.....	1–100,000	decided
	Capsaicin[2].....	1–1,000,000	very pungent, burning
	Capsaicin[2].....	1–10,000,000	decided

THE ASSAY OF ACONITE.

BY A. R. L. DOHME.*

The work covered by this paper represents what has been done during the past three years by the Scientific Section of the American Drug Manufacturers' Association who have felt that its results should be made known to the medical and pharmaceutical professions generally.

The primary problem was to attempt to decide whether the chemical assay of aconite and its preparations had any real value, and the resultant problem was to determine if the physiological assay was accurate and trustworthy. The present official assay process U. S. P. IX Revision is a chemical one with an alternative physiological assay, but the chemical assay is the standard. In the U. S. P. VIII there was only a chemical assay as the official process. In both cases the end-product was represented by ether-soluble alkaloids. We have shown that ether-soluble alkaloids are not all aconitine but represent a more or less variable proportion of aconitine and its products of hydrolysis benzoyl-aconine and aconine. This variability alone makes the assay process of little value as an absolute standard of therapeutic efficiency and, as well, makes its relative or comparative value more or less of an uncertain quantity.

In order to determine definitely if the three alkaloids which constitute the ether-soluble alkaloids—aconitine, benzoyl-aconine and aconine—could be separated from one another by chemical means a supply of pure aconitine was procured and hydrolyzed into benzoyl-aconine and some of the latter hydrolyzed further into aconine. After thus converting a number of grammes in this way and obtaining

[1] Squibb's powdered, purchased 1918, labelled: "the dried ripe fruit of *capsicum fastigiatum;* the genuine East Indian variety, * * * ;" histologically this presents the characteristic epidermis of African capsicum.

[2] Sample furnished by Dr. Arno Viehoever of the Bureau of Chemistry, U. S. Department of Agriculture, University of Illinois School of Pharmacy.

*Chairman, Committee on Aconite of Scientific Section of American Drug Manufacturers' Association.

a supply of each of benzoyl-aconine and aconine in pure condition, attempts were made to determine if varying solubility in all available solvents or precipitation by all known precipitants might give a method of separating them when contained in a mixture. The result was, however, that no method was discovered by which they could be quantitatively separated, as they showed similar solubilities and precipitation by precipitants. It was, therefore, decided that a chemical separation quantitatively was not feasible, and that the so-called chemical method of assay was not possible, provided our aim was to get as the end-product of our assay only aconitine.

It was also determined by animal experiments that benzoyl-aconine and aconine do not possess the therapeutic properties of aconitine, and that their lethal dose is quite far removed from that of aconitine.

Hence the final conclusion reached was, that the present chemical assay of aconite for ether-soluble alkaloids was misleading and untrustworthy and had better be abandoned.

The next part of our problem was to see if a physiological assay could be developed which would be of some real value in approximately determining the therapeutic efficiency of aconite and its preparations. This, of course, at once opens up the question as to the correctness of a method of assay which has as its criterion and basis the lethal dose or the amount that will kill a definite weight of animal per gramme. Or in simple form, is lethal power a basis for therapeutic efficiency and is one drug that will kill 300 Gm. of guinea pig in a dose of one milligramme twice as efficient therapeutically upon human beings as one that will kill 300 Gm. of guinea pig in a dose of two milligrammes? On this question pharmacologists and physiologists are apt to divide and differ. As lethal dose is the basis used in physiological assay methods, it is probably the only, and hence the best basis available for determining relative therapeutic efficiency of aconite.

Beginning with the pure aconitine crystals we used for making our hydrolysis products for above experiments, our committee sent out samples of same and of a sample of fluidextract of aconite to the physiological chemists of five different laboratories. The prime purpose of this was to determine whether results by such a minimum lethal dose method would be sufficiently close in the hands of varying laboratories and observers to warrant hoping to utilize it in an assay method—assuming, of course, that minimum lethal dose on guinea pigs would be a basis for therapeutic value. The results follow:

	Aconitine cryst.	Fluidextract of aconite root.
Sharp & Dohme	.0000000625 Gm. per Gm. wt. of guinea pig	0.000300
Upjohn	.0000000600 Gm. per Gm. wt. of guinea pig	0.000266
Parke, Davis & Co	.0000000600 Gm. per Gm. wt. of guinea pig	0.000300
Eli Lilly & Co	.0000000625 Gm. per Gm. wt. of guinea pig	0.000275
Norwich Pharmacal Co	.0000000510 Gm. per Gm. wt. of guinea pig	0.000360

If we assume that minimum lethal dose on guinea pigs is a basis for therapeutic efficiency of aconite then these results distinctly indicate that this method is sufficiently trustworthy and efficient to serve as an assay method to determine the therapeutic efficiency of aconite preparations based upon pure aconitine, crystallized, as a standard.

The Scientific Section of the American Drug Manufacturers' Association hence recommend that the chemical assay be dropped for aconite and its preparations and a physiological assay based upon aconitine crystallized, U. S. P., be substituted in its place.

In my laboratory the m. l. d. for benzoyl-aconine and aconine were also determined on guinea pigs in comparison with the aconitine and the following results obtained:

	M. l. d. guinea pig.	
Aconitine cryst	0.0000000625	Gm. per Gm. wt. of guinea pig
Benzoyl-aconine	0.00002	Gm. per Gm. wt. of guinea pig
Aconine	0.00025	Gm. per Gm. wt. of guinea pig
Fluidextract Aconite Root	0.00003	Gm. per Gm. wt. of guinea pig

These results indicate that aconitine is about 300 times as efficient, *i. e.*, toxic, as benzoyl-aconine and 4000 times as toxic as aconine and at the same time they apparently possess practically none of the characteristic properties therapeutically of the aconitine—as, for instance, producing numbness on the tip of the tongue, etc.

The method employed in these experiments was for the fluidextract of aconite to dilute 1 Cc. thereof to 10 Cc. with 50% alcohol. Use 300 to 400 Gm. guinea pigs and calculate the dose per pig and dilute this with normal salt solution to a total volume of 1.5 Cc. per pig. Inject this into the subcutaneous tissues of the abdomen and take as a lethal dose the smallest amount which will kill within 24 hours.

For the aconitine dissolve 0.1 Gm. in 100 Cc. of 2% acetic acid. Dilute 1 Cc. of this solution to 10 Cc. with distilled water giving a 1:10000 solution of aconitine. Calculate the total dose required for a pig of 300 to 400 Gm. and dilute with normal saline solution to a sum total of 1.5 Cc. and inject as for the fluidextract of aconite. Approximately 0.00000005 per gramme is usually the lethal dose.

With the aconitine, crystallized, above used as a standard it will now remain to establish by comparative tests in various laboratories the extent of agreement reached in the application of above method of physiological assay for fluidextract and tincture of aconite as well as the drug aconite, which latter will of course only be an application of the method of the two fluid preparations, as a liquid extract will have to be prepared to make the assay. This work is now before our Committee on Aconite and will, doubtless, be worked out sometime soon.

BALTIMORE, MD.
May 16, 1921.

THE CONSTITUENTS OF THE ROOTS OF AMERICAN GINSENG.*

BY YING C. WONG.

Ginseng has been esteemed by the Chinese for several thousand years. The roots obtained from plants growing in China and Korea furnish one of the valuable and reliable medicines. The properties may be summarized in a general way as being alterative and tonic. The price of the best Chinese roots ranges from $480 to $800 a pound. Owing to the great demand for Chinese Ginseng, the native plants have become very much reduced as the wild roots are most highly esteemed; the commercial supplies are largely met by the drug obtained from cultivated plants. For almost a hundred years, American Ginseng has been exported to China, and at the present time more than a million pounds are shipped annually. The wild American roots are considered to be much more valuable than those collected from cultivated plants.

The name Ginseng or Schinseng is applied to the roots of *Panax quinquefolium* (American Ginseng) and *Panax Ginseng* (Chinese Ginseng), perennial herbs, belonging to the family of Araliaceae, the former growing in rich woods in the eastern United States and Canada, and the latter indigenous to the mountainous forests of eastern Asia and cultivated in northern China, Korea and Japan. Ginseng has not been subjected to any very careful scientific investigation, as all preliminary examinations regarding its constituents have shown that they are not of such a striking character as those of the alkaloidal drugs. The drug undoubtedly possesses some value in medicine, and it was considered desirable to investigate its constituents with the view of throwing some light on its value as a medicine.

As it is very difficult to obtain any large quantity of authentic specimens of wild roots and also due to the high price of the same, these investigations were made with commercial material which was apparently derived from cultivated plants.

American Ginseng appears to have been first chemically examined by Rafinesque,[1] who stated that he found in it a camphor-like body, on which depends the taste of the drug and to which he gave the name "panacine."

S. S. Garrigues[2] also examined the root, and he observed the presence of a substance which he called neither an alkaloid nor a glucoside, and he gave it the name "panaquilon." Garrigues assigned to this substance the formula $C_{12}H_{25}O_9$. He further showed that "panaquilon," when treated with strong acids, was converted into a white substance, with the escape of carbon dioxide and water. For this white substance, Garrigues proposed the name "panacon" ($C_{11}H_{19}O_4$).

* The writer desires to express his gratitude and thanks to Prof. Henry Kraemer for having suggested this investigation and assisted in obtaining the samples, and for his kind guidance throughout the course of the work.

The work was carried out at the University of Michigan in partial fulfillment of the requirements for the degree of Master of Science. (See p. 310 April JOURNAL A. PH. A. '21, also p. 816, Vol. IX, JOURNAL A. PH. A.—Editor.)

[1] *Am. J. Pharm.*, 1854, 26, 510.

[2] *Ibid.*, 1854, 26, 511.

Davydow[1] investigated these principles discovered by Garrigues but added nothing new to our information concerning them.

EXPERIMENTAL.

CHEMICAL EXAMINATION.

The material employed for this part of the investigation consisted of the roots of the above described American Ginseng, which was perfectly authentic. These roots were from cultivated plants ranging from 4–6 years old. They were dry and were ground into powder. As a preliminary experiment, a small portion of 20 gramme of the ground material was tested for the presence of an alkaloid, but with a negative result.

In order to ascertain whether an enzyme were present, 100 Gm. of the ground material were macerated with water at the ordinary temperature for two days. To the expressed and filtered liquid about twice its volume of alcohol was added, when a gelatinous precipitate was produced. This was collected, washed with a little alcohol, and dried in a vacuum over sulphuric acid, when it amounted to about 0.2 Gm. It responded to the biuret reaction, and slowly hydrolyzed starch, thus proving the presence of an enzyme.

Another portion of 34 Gm. of the ground material was successively extracted in a Soxhlet apparatus with various solvents, when the following amounts of extracts, dried at 100° C., were obtained:

Petroleum ether extracted	0.1699 Gm.	equals	0.47%
Ether extracted	0.2891 Gm.	equals	0.85%
Chloroform extracted	0.0433 Gm.	equals	0.12%
Ethyl acetate extracted	0.4192 Gm.	equals	1.23%
Alcohol extracted	5.9464 Gm.	equals	17.49%
Total	6.8679 Gm.	equals	20.16%

For the purpose of a more detailed examination, a quantity of 2000 Gm. of the powdered material was extracted with hot 92% alcohol, when, after the removal of the greater portion of the solvent, 410 Gm. of a dark brown, viscid extract were obtained.

The whole of the above mentioned extract was mixed with cold water, and a yellowish brown emulsion was formed in which small globules of a dark brown oleoresin were suspended. In order to separate these globules, the whole liquid was shaken out three times with ether. The united ethereal liquid (A), which contained the oleoresin, was of a dark brown color, while the aqueous liquid (B) which contained the saponin and other substances was yellowish brown.

Examination of the Ethereal Liquid (A)

After the removal of the ether, a dark brown syrupy extract was obtained which amounted to 36 Gm. This was mixed with a little water and distilled with a current of steam. The distillate was extracted with ether, and the solvent removed, when a small amount of about 0.5 Gm. of a pale yellow essential oil was obtained. This had a pleasant odor, to which undoubtedly the odor of the drug is due. To a little of this oil, a drop of concentrated sulphuric acid was added, a yellowish

[1] *Phar. Zeitschs. Rusl.*, pp. 97, 113, 13, and *Am. J. Pharm.*, 1890, 338.

brown color was produced, which upon the application of gentle heat for a few minutes changed to pink. When another small portion was treated with aniline and hydrochloric acid, a blood red color was produced on standing, and so it yielded the color reaction for furfural.

After the above operation, there remained in the distilling flask a dark brown, resinous substance. The water was decanted and petroleum ether added to dissolve out the resinous substance. This mixture was transferred to a separatory funnel and washed with hot water. The petroleum ether layer was then separated and the solvent removed. The resinous mass obtained amounted to 18 Gm.

This dark brown resinous mass was dissolved in alcohol and heated under a reflux condenser with an alcoholic solution of potassium hydroxide for four hours. When saponification was completed, the alcohol was evaporated off, water added, and the alkaline mixture transferred to a separatory funnel and extracted several times with ether. The ethereal extracts were then united, washed with a small quantity of water, dried, and evaporated. A small amount of a crystalline substance was obtained, which separated out from absolute alcohol in plates, and when dried gave a melting point between 132–134°. A small amount of this substance was dissolved in chloroform and the solution shaken with an equal quantity of concentrated sulphuric acid, the chloroform layer on standing for a while was colored red and then purple. This substance, thus, reacted to the phytosterol color reaction, and it is seen to be a phytosterol, which was too small an amount for any further separation and investigation.

Examination of the Aqueous Liquid (B).

This aqueous liquid contained the saponin and a small amount of sugar. As stated above, the main point of this work was to isolate this saponin in its pure state and to study its nature. To isolate it, the aqueous liquid was treated with a saturated solution of lead subacetate by which it was precipitated as a lead salt. The precipitate was suspended in water and hydrogen sulphide passed through it. It was filtered and the filtrate exactly neutralized with potassium hydroxide and allowed to stand for a few hours after the addition of barium hydroxide. The barium compound of the saponin was collected and suspended in water and freed from barium by means of carbon dioxide. The solution was evaporated in a vacuum and the concentrated residue dissolved in methyl alcohol and finally precipitated by pouring the alcoholic solution into a large volume of ether (about six times that of the alcoholic solution). To purify it, this process was repeated three times; the final product obtained was of a slightly yellowish white color; it amounted to 36 Gm. after being dried. A determination of its ash content was made which amounted to 1.04%.

Properties of the Saponin: This saponin dissolves readily in water and warm glycerin. It is slightly soluble in 95% alcohol and in glacial acetic acid, but moderately in hot alcohol and methyl alcohol. It is insoluble or almost so in ether, chloroform, benzene, amyl alcohol and ethyl acetate. When dried, it is of light yellowish white color, and it imparts a yellowish color to its water, glycerin, and alcoholic solutions. In the dry and powdered state, it is amorphous. It melts at 170–172° C. It has a slightly bitter taste.

In water solution, this saponin produces decided foaming under agitation. Solutions as weak as 1 per 1000 exhibit this peculiarity. This frothing property can easily be shown by placing a small quantity of the saponin in a beaker, the latter put under the tap and water run down on it. It is non-toxic to animals or fish, and has no haemolytic action.

It is acid to litmus and phenolphthalein. Concentrated sulphuric acid dissolves it with first a reddish color, changing into violet, and later into more intense red. With a mixture of equal parts of alcohol and sulphuric acid in the presence of a drop of ferric chloride, it gives a bluish green color. When its solution is added to a permanganate solution, the latter is reduced. This saponin is precipitated by neutral as well as basic lead acetate, and also by barium hydroxide. Its water solution does not reduce Fehling's solution, but if it has first been heated with a dilute mineral acid, the Fehling solution is reduced. The heating with dilute mineral acids produces a crystalline substance sapogenin, and a pentose. It does not contain nitrogen and its empirical formula is $(C_8H_{12}O_5)X$.

Substance* 0.3288 Gm. gave 0.6120 CO_2 and 0.1871 H_2O C = 50.79; H = 6.26 percent.
0.3362 Gm. gave 0.6288 CO_2 and 0.1890 H_2O C = 50.83; H = 6.31 percent.
$(C_8H_{12}O_5)X$ requires C = 51.06; H = 6.38 percent.

*The saponin used in the combustion analysis was dried at 110°.

The Acetyl Derivative of the Saponin: During the process of investigation it was noticed that this saponin could be acetylated, yielding a definite product. This derivative was prepared by heating 2 Gm. of saponin with 2 Gm. of sodium acetate and 8 Gm. of acetic anhydride for one hour in a reflux condenser. The mixture was poured into water and the precipitated solid collected, washed and dried in a vacuum desiccator over sulphuric acid. The product thus obtained was a dark mass, which melted below 100° C. It was readily soluble in the ordinary organic solvents, but could not be crystallized. A combustion analysis showed the following results:

Substance dried at 110° 0.3848 Gm. gave 0.7616 CO_2 and 0.1886 H_2O C = 53.98; H = 5.51%
$(C_{17}H_{21}O_{10})X$ requires C = 53.76; H = 5.5%

A determination of the acetyl value of this acetylated product was made by saponifying 0.5 Gm. with alcoholic potash for half an hour, removing the alcohol by evaporation, acidifying with 1:10 sulphuric acid and distilling. The distillate was titrated with $\frac{N}{10}$ NaOH and 0.339 Gm. of acetic acid was found to be present which corresponds to 0.2929 Gm. CH_3CO or 58.58% of the acetylated saponin. This acetyl value together with the results of the combustion would indicate that the acetylation had taken place in the whole molecule of the saponin.

Hydrolysis of the Saponin.

Formation of a Sapogenin and a Pentose: It has already been mentioned that a substance insoluble in water results when the saponin in solution is heated with a dilute mineral acid. To obtain the substance, 5 Gm. of the saponin were dissolved in a little water and then 50 Cc. of a 10% aqueous solution of hydrogen chloride added, and the mixture heated on a water-bath for four hours, when a crystalline hydrolytic product separated out from the hot liquid. This product

was collected, carefully washed with water, and dried, the filtrate being set aside for the subsequent examination of the sugar.

This sapogenin was of a light brown color. It was insoluble in water, chloroform, ether or benzene, and slightly soluble in absolute alcohol, but more readily so in alcohol containing a little water. When it was dissolved in acetic anhydride, a little chloroform added, and then a few drops of concentrated sulphuric acid, a purplish red color was produced, which finally disappeared. When a solution of the substance in aqueous alcohol was agitated, a copious frothing was produced, but the permanency of the latter is not so great as in the case of the saponin itself. It melted at 188–191°. A combustion analysis showed the following results:

Substance dried at 110° 0.1614 Gm. gave 0.4114 CO_2; 0.1260 H_2O C = 69.51; H = 8.73%
$(C_{21}H_{32}O_5)X$ requires C = 69.23; H = 8.78%

The filtrate obtained above was examined for sugars. It was concentrated on the water-bath and the concentrated liquid divided into three portions to be tested for the presence of glucose, pentose and galactose respectively, but the first and third resulted negatively.

In order to arrive at a quantitative relation between the saponin and the liberated pentose, 1 Gm. of the saponin was distilled with 12% hydrochloric acid as carried out in the provisional method of the A. O. A. C.[1]

This yielded 0.01662 Gm. of furfural phloroglucide. A duplicate experiment was performed on the same amount of saponin, which yielded 0.01760 Gm. of furfural phloroglucide. The average of these two results, that is 0.01711 Gm., is equivalent to 0.022689 Gm. of pentose or 2.2689 percent of the saponin taken.

A quantitative determination of sapogenin liberated from the saponin was also carried on two samples of the saponin, by the above method. The first one of 2 Gm. was heated for one hour which yielded 0.5604 Gm. of dry sapogenin or 28.02% of the saponin, and the second of 1.6 Gm. was heated for four hours, yielding 0.4826 Gm. of sapogenin or 30.16% of the saponin.

From these experiments, the yield of pentose and that of sapogenin were below those figures which were expected from theoretical considerations, and these discrepancies might have been caused by incomplete heating and hydrolysis.

Microscopical Examination.

A number of papers on the microscopic structure of this root have been published, the most important of these being the one by Davydow.[2] In the description, he stated that the parenchyma cells near the rather thick cork contain clusters of crystals of calcium oxalate, while in the examination of this root, the writer failed to find any of these crystals present. The accompanying plate shows the general appearance of a cross section of the root.

The cross sections examined were obtained from both fresh and dry roots, the latter being soaked in dilute alcohol, and the following internal structures were observed:

CORK: The cork consists of four to six rows of tabular cells which are nearly free from starch the walls having large pores and reticular thickenings.

[1] U. S. Dept. of Agric., Bur. of Chem., *Bul.* 107 (rev.), p. 54.

[2] Rep., *Apoth. Ztg.*, 1890, 137.

Transverse section of American ginseng root. *C*—cork; *P*—cortical parenchyma; *M*—medullary rays; *K*—cambium; *F*—wood fibers; *T*—tracheae; *PP*—pith parenchyma; *O*—oleoresin secretion cavities; S—Starch grains.

CORTICAL PARENCHYMA: The outer layers of the cortical parenchyma cells are long in outline with rounded corners, while those bordering the cambium are smaller and round in outline. The parenchyma of the cortex contains numerous starch grains which exhibit one or two flattened surfaces; among the parenchyma cells occur large schizogenous ducts in which an oleoresin is secreted.

CAMBIUM: The cambium zone is marked by its dark brown color. The cells are rectangular, and they are usually not clearly seen because the walls are partially collapsed.

MEDULLARY RAYS: The medullar ray cells are tangentially elongated, and somewhat rectangular in outline.

TRACHAE: The vessels are angled in outline. They show either simple or bordered pores and recticular thickenings.

WOOD FIBERS: The wood fibers are thick-walled and highly angled.

PITH PARENCHYMA: The pith parenchyma cells are rounded in outline and as large as the cortical parenchyma cells, which also contain considerable starch. Saponin occurs in some of the parenchyma cells of both the cortex and pith, and its presence may be detected by the formation of a violet-red coloration with concentrated sulphuric acid.

GROUND OR POWDERED GINSENG: The color of powdered ginseng is yellowish white. It has a feeble odor and a sweet, slightly aromatic taste, somewhat analogous to that of licorice powder. Under the microscope, numerous starch grains are seen, which are mostly spheroidal, varying from 0.005 to 0.02 mm. in diameter; some of which exhibit one or two flattened surfaces; and in some a small cleft is visible. The vessels are mostly in broken fragments. The wood fibers are long, occurring in groups, singly and also in broken fragments, with thickened walls, and slightly angled. Large fragments of cork cells, parenchyma tissues, medullar rays and oleoresin secretion canals with yellowish color are also seen.

SUMMARY AND PHARMACOLOGICAL TESTS.

The material used for this investigation consisted of the roots of American Ginseng, *Panax quinquefolium.*

A preliminary test was performed for the presence of an alkaloid, but with a negative result. Another one showed the presence of a relatively small amount of an enzyme.

An extract of the material, made by hot 92% alcohol and after the removal of the solvent, was treated with a little water and the mixture extracted several times with ether. The ethereal portion showed a very small amount of a pale yellow essential oil, and a dark brown resinous substance, which reacted to the phytosterol reaction.

The aqueous liquid was subsequently examined and it was found to contain an appreciable amount of sugar, and a saponin which after purification was a

light yellowish white amorphous powder melting at 170–172°. It yielded an acetyl derivative which was a dark brown mass melting below 100°. On hydrolysis this saponin was resolved into a pentose and a sapogenin which was of a darker color than the original saponin melting at 188–191°.

It has been mentioned above that this saponin is not toxic to animals or fish and has no haemolytic action. This conclusion was indicated by the following experiments:

(A) 0.5 Gm. of the saponin was dissolved in 25 Cc. of physiological salt solution, thus making it 2% in strength. Ten test tubes each containing 1/2 Cc. of a 2.5% three-times-washed sheep red corpuscles were prepared, and physiological salt solution was added to each to make the final volumes 3.5 Cc. Into these tubes were pipetted 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, and 1.0 Cc. respectively of the above prepared saponin solution. The tubes were then shaken and allowed to stand at room temperature. In 24 hours the corpuscles had settled down, leaving a colorless liquid at the top in all the tubes. The tubes were allowed to stand for one week, but no change was observed.

Another set of experiments was carried out as above except the tubes were kept in the incubator at 37° instead of at room temperature. The results were the same.

(B) A 10% solution of this saponin was prepared, 2 Cc. was injected to each of two rabbits and one guinea pig intravenously and another 2 Cc. to another guinea pig subcutaneously. All these animals were examined every day, which resulted in no symptoms of physiological activity.

(C) A 1–2000 solution of the saponin was prepared in a large glass jar and a gold fish weighing 28 Gm. put in. The jar was placed outside of a window and the fish fed with fish food. For two days, it was just as healthy as it was at the beginning. At the end of four days no change was shown, it was taken out and its weight noted, which showed neither increase nor decrease.

THE RELATION OF THE DISSOCIATION OF HYDROGEN TO ENZYMIC ACTIVITY.* PEPSIN STUDIES.

BY HOWARD T. GRABER.

Sörensen demonstrated that the measure of the reaction of hydrolysis by Pepsin, and also Catalase, is not dependent upon the titrable acidity but rather upon the "H" ion concentration.

He showed that the action of these enzymes has an optimum at a definite "H" ion concentration and that the presence of other ions exerts an influence which, while not measureable, should not be neglected. He pointed out that he could produce one and the same "H" ion concentrations by means of either of two methods:

1—By the use of what he termed regulators or buffers, or

2—By the dilution of the acid.

It was also shown that regardless of what buffer controls the acidity, and irrespective of the concentration of the other ions, the enzyme exerts the same activity if the concentration of the "H" ions is the same.

*Read before the Detroit Section of the American Pharmaceutical Association, May 13, 1921.

The experiments here recorded were made with the idea of corroborating the above findings with special regard to buffer action in the case of various acids, and peptic digestion.

It is universally recognized that the pepsin digest, when egg white is used as the proteid under digestion, takes place best in a medium of .3% HCl and at a temperature of 52°C. If the peptic activity were dependent upon the titrable acidity alone, it would only be necessary to adjust other acids, both organic and mineral, to this same .3% strength and get the same activity, assuming that the acid employed does not directly inhibit peptic digestion.

The following experiment proved that this theory is fallacious.

U. S. P. test for pepsin with the use of various acids.

Acid.	Titration.	pH.	Residue.
Hydrochloric	.30%	1.25	1.5 Cc.
Acetic	.30%	3.30	17.0 Cc.
Citric	.31%	2.40	14.0 Cc.
Lactic	.32%	2.38	20.5 Cc.
Nitric	.31%	1.25	19.5 Cc.
Phosphoric	.32%	2.11	22.0 Cc.
Sulphuric	.31%	1.31	20.0 Cc.

If the titrable acidity were the controlling factor we should expect the same digestion in all of the above. The amount of titrable acid is practically the same in all.

An electrometric measurement of the dissociated hydrogen in each, at a temperature of 16° C., shows that there is quite a difference in the concentration of "H" ions. Here, however, it is evident that the three mineral acids used were of similar "H" ion concentration yet the results showed a great difference in degree of digestion. Apparently there may be an error in measuring "H" ion concentration at 16° and carrying on digestion at 52° since temperature has an appreciable effect on the dissociation of acids.

In the next set of experiments the acids were heated to 50° C., quickly measured against a calomel cell at 16° C. and the "H" ion concentration calculated as of 16°. This gave a figure which was more nearly that of the true dissociation at the higher temperature used in digestion. The results of the experiments are recorded in the following table:

Acid.	Titrable acidity.	pH at 52° C. Cell at 15° C.	Residue after digestion on 10 Gm. egg at 52° C. for 2½ hours.
Acetic	40.30%	1.16	30.00 Cc.
Citric	44.60%	.92	21.00 Cc.
Lactic	20.40%	.87	30.00 Cc.
Nitric	.55%	1.16	16.00 Cc.
Phosphoric	38.30%	.85	19.00 Cc.
Sulphuric	4.10%	1.14	19.50 Cc.
Hydrochloric	.30%	1.18	1.75 Cc.

As a result of the above test it was concluded to adjust the "H" ion concentration of the various acids at the digestion temperature, 52° C., and also consider the buffer effect of the egg white when added to the acid.

This test is most encouraging and shows that under the proper conditions, with an "H" ion concentration equal to that of .3% HCl, the phosphoric acid of 49.00 titrable acidity digested equally as well as the hydrochloric acid with a titrable acidity of .3%.

Acid.	Titrable acidity.	*p*H at 52° C. Cell at 15° C.	Residue after digestion as above.
Hydrochloric	.30%	.82	.80 Cc.
Lactic	30.50%	.87	35.00 Cc.
Nitric	.37%	.79	19.50 Cc.
Sulphuric	.98%	.79	23.00 Cc.
Citric	22.00%	.82	10.00 Cc.
Acetic	45.30%	.92	35.00 Cc.
Phosphoric	49.00%	.82	.80 Cc.

To test out the buffer effect of the albumen upon the .3% HCl, the *p*H reading was taken before adding the egg white and after adding the egg, but before adding the pepsin, and the addition of the egg white buffered the concentration from *p*H .82 to *p*H 1.19. It was also determined after digesting the egg for one, two, and two and one-half hours but no appreciable change in the concentration of the "H" ion was noted during digestion.

The results, so far compiled, led to a last and final experiment in which the "H" ion concentrations were brought to comparable values.

The last question to be settled concerns the presence of HCl as an activator of the pepsin. To determine whether the presence of HCl is necessary as an activator of the pepsin in the presence of other acids, we dissolved the pepsin in .3% HCl in four of the experiments and in phosphoric acid in the other two experiments.

Acid.	Titrable acidity.	*p*H at 50° C. Cell at 15° C.	Residue after digestion as above.
Hydrochloric	.30%	.64	.40 Cc. Pepsin phosphate
Hydrochloric	.30%	.64	.40 Cc. Pepsin hydrochloride
*Phosphoric	49.00%	.68	.60 Cc. Pepsin phosphate
Phosphoric		.68	.60 Cc. Pepsin hydrochloride
Acetic	50.20%	.68	35.00 Cc. Pepsin hydrochloride
Citric	25.90%	.63	10.00 Cc. Pepsin hydrochloride

* Same phosphoric acid used in this as in previous tests.

These results show that phosphoric acid brought to the same "H" ion concentration as .3% HCl at 52° C. before adding egg white is just as efficient as the HCl in activating peptic digestion. Also it is shown that the slight amount of HCl in which the pepsin is ordinarily dissolved has no appreciable effect on this digest, since the solution of pepsin in phosphoric acid of the same "H" ion concentration is equally successful.

It is also shown that acetic and citric acids brought to the proper "H" ion concentration at 52° C. before adding egg white are not efficient activators of pepsin digestion after the egg white is added.

This is perhaps due to the strong depressant action of the egg white which acts as a buffer toward these weakly dissociated acids. This will be investigated in later experiments.

From the Research Laboratories of the Digestive Ferments Co., Detroit, Mich.

THE ESTIMATION OF TERPIN HYDRATE IN ELIXIR OF TERPIN HYDRATE.*

BY A. G. MURRAY.

Terpin hydrate sublimes at about 100° C. and volatilizes with boiling water. In order to ascertain the conditions under which a solvent could be most satisfactorily removed from it the following experiment was carried out:

A solution of 0.8715 Gm. of terpin hydrate in sufficient alcohol to make 50 Cc. was prepared. Ten Cc. portions of this solution, containing 0.1743 Gm. of terpin hydrate, were evaporated in different ways from tared beakers. The weights of residues obtained were as follows:

	Wt. of the residue Gm.	Error.
Evaporation on steam bath with aid of a gentle blast	0.1565	—10.3%
Evaporation with aid of a gentle blast, without heat	0.1756	+ 0.8%
Evaporation in vacuo without heat	0.1756	+ 0.8%
Spontaneous evaporation	0.1747	+ 0.3%

It was evident from this that heat should not be used in evaporating the solvent. Use of the blast without heat results in a rapid evaporation at a low temperature and was the method used in all subsequent experiments.

Terpin hydrate should not be dried in adesiccator. The Pharmacopoeia states that it is "efflorescent in dry air." It was found by experiment that the loss on drying in a desiccator over night is quite considerable.

For the purpose of extracting terpin hydrate from the elixir it is desirable to use an immiscible solvent in which it is freely soluble. With respect to the solubility of terpin hydrate the Pharmacopoeia states that 1 gramme dissolves in about 200 Cc. of water, 13 Cc. of alcohol, 135 Cc. of chloroform and 140 Cc. of ether. The solubility data given in Squire's "Companion to the British Pharmacopoeia" (19th Ed.) are as follows: 1 in 280 of water; 1 in 14 of alcohol (90%); 1 in 46 of alcohol 60%. Beilstein[1] states that terpin hydrate is insoluble in petroleum ether.

Since the solubility in ether or chloroform is only slightly greater than in water, quantitative extraction with one of these solvents would probably require long continued treatment. This conclusion is apparently confirmed by a description by Kay and Perkin[2] of the synthesis of terpin in which they speak of saturating the aqueous solution with ammonium sulphate and "extracting at least 20 times with large quantities of ether on the shaking machine."

It was thought that possibly acetone, which has a limited miscibility with water saturated with salt, might prove a suitable solvent. While the attempt to use acetone was finally abandoned some of the observations made may be recorded. It was found by experiment that 1 Gm. of terpin hydrate dissolves in about 27 Cc. of acetone at room temperature (25°). Terpin hydrate was not precipitated from this saturated solution in acetone by dilution with chloroform.

It was found easily possible to extract terpin hydrate from the elixir by diluting with water, saturating with salt and shaking out with a mixture of acetone and

*Contribution from the Bureau of Chemistry, U. S. Department of Agriculture.

[1] "Organische Chemie."

[2] *Jour. Chem. Soc. Trans.*, 19 (1907), I, 372.

chloroform or ether, but the solvents extracted also some glycerin and sodium chloride unless the proportion of acetone in the solvent was reduced to such an extent that it no longer possessed any advantage over alcohol.

In the following method which was found to yield the most satisfactory results it will be noted that no account is taken of the essential oil which the official elixir contains, as the error occasioned by it is too small to be significant. If, however, it is desired to avoid the presence of the volatile oil in the residue it can be readily removed by a preliminary extraction with petroleum ether in which terpin hydrate is insoluble. The method is as follows:

Dissolve 20 grammes of common salt in 100 Cc. of water, or if more convenient add 1 volume of water to 3 volumes of a saturated aqueous salt solution. To a convenient measured volume of the sample of elixir add the prepared salt solution until the alcohol content is from 10% to 15% by volume. Shake out with four portions, one-fourth volume each, of chloroform containing 5% to 7% alcohol by volume. Wash each portion of the solvent successively through 5 Cc. of the prepared salt solution. Filter through a pledget of purified cotton into a tared beaker or small crystallizing dish, finally rinsing the cotton and the tip of the funnel with a little alcohol. Evaporate with the aid of a blast and without the application of heat. Wipe off any moisture that may have collected on the outside of the dish and allow to stand fifteen minutes before weighing.

Ten Cc. of a sample of elixir of terpin hydrate prepared in accordance with the formula of the National Formulary with the exception of the essential oils when assayed by the proposed method yielded 0.1764 Gm. of terpin hydrate instead of 0.1750 Gm., an error of + 0.8%.

While the method was devised primarily for the assay of elixir of terpin hydrate it may perhaps be adapted to other preparations of this drug, which do not contain other ingredients extractable by the immiscible solvent used or which can be freed from interfering substances without loss of terpin hydrate.

TINCTURE OF DIGITALIS AND THE INFUSION IN THERAPEUTICS.*,[1]

BY SOMA WEISS AND ROBERT A. HATCHER, M.D., NEW YORK.

Our knowledge of the pharmacology of the digitalis group is increasing rapidly, and its therapeutic use now begins to approach an exact science more nearly, perhaps, than that of all excepting a few drugs. But there are still many minor points, and not a few major ones, that require further study.

Clinicians have long held the opinion that the action of the tincture of digitalis differs qualitatively as well as quantitatively from that of the infusion. This difference is usually explained on the ground that the several active principles found in the leaf are not extracted in the same relative amounts by the menstruum used in making the tincture and the water used in making the infusion.

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*From the Laboratory of Pharmacology of Cornell University Medical College.

[1] This investigation has been made with the assistance of a grant from the Committee on Therapeutic Research, Council on Pharmacy and Chemistry, American Medical Association. Reprinted from *Journal A. M. A.*, February 19, 1921, p. 508.

Pharmacologists have shown a disposition to give too little consideration to the views of the older therapeutists when these appear to be in conflict with the deductions drawn from the results of modern experiments, even as many therapeutists have a tendency to dismiss pharmacologic deductions when they fail to support opinions based on clinical observations. Obviously, we can accomplish no more through the clinical use of a drug, however extensive our knowledge of its pharmacology may be, than was accomplished formerly by one who chanced to discover the correct way of employing it, and it is probable that William Withering used digitalis with success equal to that of many of the clinicians of to-day.

Nothing could be farther from our purpose than to attempt to belittle exact pharmacologic investigations; but it is true that pharmacologists and chemists are responsible for much of the misunderstanding that exists to-day regarding this drug. On the other hand, many of the older clinicians were acute observers; and while their deductions may have been faulty at times, these were often founded on fact. This should serve as a warning to us against dismissing long established clinical opinions without attempting to understand the basis for their existence, and to explain wherein the error lay when such is proved to exist. With the clearing away of misconceptions, the use of the drug will approach the state in which the general practitioner will be able to use it even more wisely than Withering employed it. We shall, therefore, discuss briefly the basis for the view that the constituents of the infusion of digitalis differ in kind from those of the tincture.

It is not our purpose to discuss the chemical nature of the active principles of digitalis, or their solubilities, except as may be necessary for an understanding of the question of the composition of the tincture and the infusion.

COMPOSITION OF THE TINCTURE OF DIGITALIS.

Digitoxin, digitalin and digitalein, the three principles generally supposed to represent the activities of the leaf, are soluble in alcohol, and all of these (if, indeed, they exist in the leaf) are present in the tincture; and it may be stated at once that the official tincture represents the activity of the leaf completely, that is to say, that the tincture contains all except traces of the active principles of the dried and powdered leaf from which it is made.

There is no way of estimating the total amounts of the several active principles in the leaf or in the tincture directly; therefore the following method was used in order to determine whether the tincture represents the leaf fully:

A tincture was prepared according to the directions of the United States Pharmacopoeia, and the marc (the drug left in the percolator after extraction) was dried and weighed. The dried marc weighed just half as much as the drug weighed previous to extraction; this was odorless and tasteless, or nearly so. This in itself points strongly to the removal of all the active principles during percolation, for all of them are very bitter, and nothing is destroyed during the simple process of extraction with the menstruum consisting of three volumes of alcohol and one of water.

An infusion was then prepared by pouring 1000 Cc. of boiling water on 7.5 Gm. of the dried marc, representing 15 Gm. of the original digitalis from which the tincture had been made, and this infusion was tested in order to determine whether it contained any active substance.

The intravenous injection of 150 Cc. of this infusion of the marc per kilogramme of body weight was without perceptible effect, though this dose was equal in volume to about twenty-five times that required of an infusion of this specimen of digitalis to cause death. The cat then received a further intravenous injection of the full average fatal dose of ouabain before death

resulted, showing conclusively that the infusion of the marc (and the marc itself) contained not more than traces of water-soluble active digitalis principles.[1]

The presence of saponin-like bodies (digitonin or digit-saponin) in digitalis has given rise to much discussion. These substances are devoid of the therapeutic action of digitalis, but, on the other hand, they may be deleterious when large amounts are injected intravenously, and their significance in digitalis therapy is frequently misunderstood. The gastric disturbance which sometimes follows the oral administration of tincture of digitalis has been attributed largely, but erroneously, to these substances, though Cushny[2] states that the tincture contains less of these than the infusion. Presumably Cushny means the tincture made from a given weight of drug contains less than the infusion which represents an equal weight of the drug.

We are not aware of any direct experimental evidence on which this statement is based, but one frequently sees it coupled with the explanation that these saponin bodies are insoluble in alcohol. This deduction is misleading in that while they are insoluble in absolute alcohol, the official tincture is made, as previously stated, with a menstruum of about 70 percent alcohol. We have therefore attempted to determine whether the marc left after preparing the official tincture contains saponin-like bodies or not, and if so, the approximate amount as compared with that present in the official infusion, though the matter did not appear to us to be of great practical importance, because it is well known to pharmacologists that the leaf contains only small amounts of these bodies, and even these amounts are not absorbed readily from the gastro-intestinal tract, nor do they cause local irritation in amounts at all comparable to those that can ever be administered during the therapeutic use of digitalis.

PRESENCE OF DIGITONIN.

Kiliani,[3] who is probably the greatest living authority on the chemistry of digitalis, states that digitalis leaves contain only traces of digitonin, and he also says[4] that Boehm found that digitonin causes gastric irritation in dogs only after the oral administration of enormous doses. These results attributed to Boehm have been confirmed for experiments in this laboratory. Unfortunately for the cause of scientific therapy, the fallacy regarding the supposed rôle of digitonin in the production of gastric disturbance following the administration of the tincture of digitalis in therapeutic doses appears to us to have been kept alive largely from motives of financial interest; at least, we have been unable to discover any evidence to support the theory mentioned, and an advantage sometimes claimed for proprietary substitutes for the official preparations of digitalis is that they lack the irritant or disturbing effect of these saponin-like bodies.

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[1] The use of ouabain in this experiment is based on what is termed the "combined ouabain" method for the estimation of small amounts of digitalis bodies, which was described by Hatcher and Brody (*Am. J. Phar.*, 82, 360, 1910). This method consists in determining the difference between the average fatal vein dose of ouabain for the cat per kilogram of weight and that required to kill after the previous injection of a dose of any digitalis body. The difference represents the percentage of the fatal dose that is attributable to the digitalis body under investigation.

[2] Cushny, "Pharmacology and Therapeutics or the Actions of Drugs," 1918, p. 399.

[3] Kiliani, *Arch. d. Pharm.*, 243, 7, 1905.

[4] Kiliani, *Ibid.*, 230, 260, 1892.

We undertook to compare the laking action of an infusion prepared from the powdered lead with that of one made from the marc of the tincture, but the laking action exerted on partially washed corpuscles (obtained by mixing blood with 100 parts of physiologic sodium chloride solution and allowing the corpuscles to settle to the bottom of the vessel) was so feeble in both cases that we abandoned further effort in this direction.

We found that the intravenous injection of digitonin (Merck's) in doses of 20 mg. per Kg. of body weight caused hematuria in three experiments on cats, and, on the other hand, the intravenous injection of an infusion of the marc of the tincture in doses of 150 Cc. per Kg. of weight produced no perceptible effect. From this we may conclude that very little digitonin remains in the marc of the tincture and whether or not the tincture contains more than traces of it, the difference between the amounts of it present in the tincture and in the infusion of corresponding amounts of the drug are of no therapeutic or toxicologic importance.

The subject does not seem to us worth further consideration in view of what has been said, especially since we have such high authority as Kiliani for stating that the leaf contains only traces of digitonin.

The Pharmacopoeia gives directions for the biologic assay of digitalis with the standard of activity required for the leaf, the fluidextract and the tincture, but none for the infusion; it is far more important to the clinician, therefore, to know to what extent the infusion represents the leaf from which it is made than to know whether the tincture contains more than traces of saponin bodies.

DIGITALEIN AND DIGITALIN.

Digitalein is very soluble in water, and it may be accepted that any that may be present in the leaf passes into the infusion. Digitalin (the true digitalin of Schmiedeberg and of Kiliani) is also extracted by water, possibly with the aid of the saponin bodies; but neither digitalein nor digitalin is absorbed readily from the gastro-intestinal trace of animals or that of man.

Oral doses of digitalein equal to the fatal vein dose were administered to cats daily periods for a week, and it was then found by means of the combined ouabain test that there was little persistence of action. Amounts of digitalein equal to four or five times the single fatal vein dose were administered to each of several cats through a stomach tube in single doses without inducing perceptible effects.[1]

Schmiedeberg[2] states that the absorption and behavior of digitalein are such that it is difficult to obtain therapeutic effects with it, and that digitalin is absorbed slowly and irregularly from the gastro-intestinal tract. Naunyn[3] states that Ger-

[1] Unpublished experiments performed in this laboratory some years ago and recently confirmed by us in part. The digitalein of commerce is said to consist of a mixture of glucosides from Digitalis purpurea, prepared according to the process of Schmiedeberg, and containing digitoxin, digitalin and digitalein (New and Non-official Remedies, 1920, p. 88); and since the proportions of these three appear to vary in different specimens of commercial digatalein, we do not pretend to say that all specimens show the same behavior. In fact, it is our opinion that digitalein has no place in the materia medica while it remains so uncertain in composition and activity.

[2] Schmiedeberg, *Arch. f. Path. u. Pharm.*, 62, 305, 1910.

[3] Naunyn, *Therap. d. Gegenw.*, 1, 193, 1899.

man digitalin (which consists of true digitalin in part) exerts only a weak and uncertain action after its oral administration to man; and Eggleston[1] found that both digitalein and digitalin are absorbed so poorly from the gastro-intestinal tract of man (as judged by the lack of therapeutic effects) that they are unsuitable for therapeutic use.

ABSORPTION OF DIGITOXIN.

Digitoxin is practically insoluble in water, and it is commonly stated that the infusion contains only traces of it,[2] or that it contains more or less of the digitoxin held in suspension by the saponin bodies. Sollmann[3] states that a 1 : 10 infusion (note that this is not the official) contains two-thirds of the digitoxin of the leaf.

The evidence that is available to us appears to show incontrovertibly that digitoxin is absorbed from the gastro-intestinal tract of man with a far greater approach to uniformity than is either digitalin or digitalein. It is only proper to state that Schmiedeberg[4] states that the insoluble digitoxin is absorbed even less regularly than digitalin, the administration of a given amount causing pronounced effects in one case and none in another. This is apparently an example of erroneous deduction, following the view so commonly held that insolubility in water exerts a profound influence on the absorption of even those drugs which are given therapeutically in doses of a milligram. Solubility does play an important rôle in the absorption of drugs which are given in doses of a gramme or more, but this factor is of minor importance with reference to the absorption of such minute amounts as one gives of digitoxin.

Naunyn[5] used digitoxin, and states as the result of clinical experience that it is absorbed completely, despite its insolubility (in water). Huchard[6] comments on the frequent lack of therapeutic success with different specimens of digitalis and says that he always gives the preference to crystalline digitaline (digitoxin) because it is uniform in its therapeutic effects. Eggleston[1] also found the absorption of digitoxin from the gastro-intestinal tract of man to be more nearly uniform than that of digitalin or digitalein; at least, he found the dose required to be less variable.

AMOUNT OF DIGITOXIN IN THE INFUSION.

Having submitted evidence that appears convincing to us that digitoxin is absorbed from the gastro-intestinal tract of man, with a far greater approach to uniformity of action than is the case with digitalein or digitalin, it is increasingly important to determine whether the infusion contains only traces of digitoxin, as Cushny[2] states, or much larger amounts, as Sollmann[3] claims, for it is evident from the foregoing that the therapeutic value of the infusion must depend on the presence in it of digitoxin, if there are only these three active principles in the leaf in important amounts, or on the presence of some other readily absorbable principle not described heretofore.

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[1] Eggleston, Cary, "Digitalis Dosage," *Arch. Int. Med.*, 16, 1 (July 1915).

[2] Cushny, "Pharmacology and Therapeutics or the Actions of Drugs," 1918, p. 399.

[3] Torald Sollmann, Manual of Pharmacology, Philadelphia, W. B. Saunders Company, 1917, p. 383.

[4] Schmiedeberg, *Arch. f. path. u. Pharm.*, 62, 305, 1910.

[5] Naunyn, *Therap. d. Gegenw.*, 1, 193, 1899.

[6] Huchard, Les maladies du coeur, 1908, p. 164.

There is no way of separately estimating the several active principles of the infusion, and we have approached the solution of the question in the same way that we determined that the tincture represents the leaf completely, that is, we examined the marc left after the infusion had been made.

VARIOUS METHODS OF MAKING INFUSION OF DIGITALIS.

Before presenting the results of these experiments, we wish to discuss the several methods that we have employed in making the infusion, including that official in the United States Pharmacopoeia, and a modification that we have used in this laboratory for several years for the preparation of infusions for use in experimental studies.

United States.—The United States Pharmacopoeia directs that the infusion shall be prepared by pouring 400 Cc. of boiling water on 15 Gm. of bruised digitalis and allowing it to macerate for one hour, after which the liquid is strained, 500 Cc. of cinnamon water is added to the strained liquid, and enough water is passed through the strainer (and the marc) to make 1000 Cc.

It would be interesting to know why the Pharmacopoeia directs that the drug be "bruised" instead of directing that the powdered digitalis be used. According to the pharmacopoeial requirements, the leaf must be "carefully" dried, but there is no statement as to the amount of moisture allowed. The lamina of digitalis is brittle, when properly dried, and one does not speak of "bruising" a brittle substance; it is only the tough and useless midribs that resist trituration and their presence serves to prevent the reduction of the lamina to a uniform powder, unless the trituration is prolonged; hence the degree of fineness of the "bruised" digitalis will vary widely, depending on the interpretation put on the direction to bruise the drug, and also on the amount of the contained moisture and the relative amount of midribs.

It will be observed also that only 500 Cc. of water is used in the extraction of the drug in making 1000 Cc. of the official infusion, since the cinnamon water, constituting half of the total volume, is added to the strained liquid and not passed through the marc on the strainer. Furthermore, not all of the infusion held in the marc is removed by the water which is passed through the strainer to make up the required volume.

British.—The British pharmacopoeia directs that the infusion be prepared by pouring 1000 Cc. of boiling water on 7 Gm. of digitalis in No. 20 powder, allowing it to stand for fifteen minutes, and straining while hot. It will be observed that this process involves the use of less than half as much drug as that of the United States Pharmacopoeia; that a uniform powder is directed; that the solvent action of all of the liquid is utilized, though for a shorter time, and that the finished infusion is not diluted by passing water through the strainer.

Author's Method.—The infusion that has been used so frequently in this laboratory for experimental purposes has been prepared essentially as follows: One thousand Cc. of boiling water is poured onto 10 Gm. of digitalis in No. 60 powder in a flask or beaker, which is allowed to stand for one hour in a boiling water-bath with frequent stirring of the infusion, in order to expel the air from the cells, thus facilitating extraction, water being added to replace that lost by evaporation; the infusion is cooled, and filtered through paper, or filtered while hot, when it is desired to maintain it in a sterile condition.

PRACTICAL TESTS OF VARYING METHODS.

Infusions were prepared in the official way and in that just described, after which the marc was washed free of the adhering infusion, or this was gotten rid of by pressing the marc between layers of filter paper, adding a small volume of water and again expressing. The marc was then dried and weighed, after which tinctures were prepared and examined for their activity by testing them on cats. We are aware that the washing of the marc with about 200 Cc. of water involves a slight error; but if 1,000 Cc. of boiling water fails to extract the active principles, we do not believe that the error involved in washing this marc with 200 Cc. of cold water

is of any importance. In some instances we estimated the activity of the infusions directly, in order to compare the activity of those prepared in different ways.

RESULTS.

The results of these experiments may be presented briefly without giving the protocols in detail.

An infusion made according to the official (U. S. P.) formula was not quite so active as one made in the same way except that 1000 Cc. of boiling water was poured on the "bruised" leaf. The activity of the official infusion was such that 6.3 Cc. was required for each Kg. of body weight of the cat to cause death (average of two fairly concordant experiments), while an average of 4.4 Cc. was required of the second infusion per Kg. of weight (average of two fairly concordant experiments). It will be seen that the activity of the official infusion was only about 70 percent of that of the second, which represented about 90 percent of the activity of the leaf; at least, the tincture prepared from the marc of the second specimen was about one-tenth as active as an average tincture, while the tincture prepared from the dried marc of the official infusion was about one-fifth as active as the average tincture of good quality. These tinctures were evaporated to expel the alcohol, after which they were diluted with physiologic sodium chloride solution before being tested on cats in the usual manner.

When the infusion was prepared by pouring 1000 Cc. of boiling water on 15 Gm. of digitalis in No. 60 powder, its activity, indicated by the direct tests on cats, was equal to that of the tincture prepared from the same amount of this specimen of drug, and, since we have seen that the tincture exhausted the drug completely, it would appear that the infusion also represented the full activities of the powder in this case. However, the activity of the tincture made from this marc was equal to about 4 percent of the activities of the leaf, the discrepancy being within the limits of error, so far as the direct test of the infusion (two experiments) is concerned; but the test of the tincture of the marc showed conclusively that at least a very small part of the active principles actually remained in the marc.

The infusion made by pouring 1000 Cc. of boiling water on 10 Gm. of the No. 60 powder represented the drug even more completely than in the case just mentioned, and the tincture prepared from the dried marc of this infusion was practically inert; at least, the injection of the tincture (after evaporation of the alcohol) representing the marc of 3 Gm. of the drug was without effect, and the animal then required 90 percent of the average fatal dose of ouabain to cause death, indicating that the marc was about one three-hundredth part as active as the drug before infusion. This affords satisfactory evidence that 100 parts of boiling water suffice for the extraction of all of the active principles of the drug in No. 60 powder when maceration is continued for an hour.

In one case the drug was used in the form of No. 80 powder in the proportion directed by the Pharmacopoeia, 15 Gm. for 1000 Cc. of infusion, after which the activity of the marc was equal to about 3 percent of that of the original powder. This indicates that the finer powder is somewhat more nearly exhausted by that volume of water than is the coarser, since the activity of the marc of 15 Gm. of No. 60 powder was slightly greater than this;[1] but when a smaller proportion of drug is used, the fine powder is not necessary, and an infusion made from the latter is tedious to strain or filter.

VARIABILITY OF OFFICIAL INFUSION.

It hardly required the present study to arrive at the conclusion that the official infusion lacks uniformity. The long standing and extreme diversity of competent clinical opinion alone would suggest this strongly, and the method of completing the required volume of the finished product by passing water through the strainer must result in some variation in the activity of the infusion, even

[1] We have found that the removal of air from the cells of the drug by means of a vacuum pump facilitates extraction with water. The particles of a No. 60 powder have a diameter of 0.23 mm., and those of a No. 80 powder, 0.17 mm.; hence the latter are less than half as large as the former.

though the formula were faultless in other particulars. A given volume of infusion is made from 15 percent of the weight of the drug that is used in making such a volume of the tincture, but the activity of the average infusion is probably equal to less than 10 percent of that of the tincture, as indicated by the biologic test, and the difference in therapeutic effectiveness is probably much greater as a rule, because the deficiency in extraction in making the infusion falls wholly on the least soluble but the most absorbable fraction, the digitoxin or the digitoxin-like substance.

From this a somewhat paradoxical situation arises. It is well known that many druggists prepare a so-called infusion by diluting the tincture or fluidextract, while those who take pride in their profession make the infusion according to pharmacopoeial directions, and it may happen frequently that the so-called infusion prepared from the fluidextract will contain more of the digitoxin than a strictly official infusion prepared with great care, and the preparation that should be condemned by all rules of scientific pharmacy will then give better therapeutic results than the one prepared conscientiously. This is in no sense an argument for slipshod pharmacy, but is an argument for improvement in the official formula for preparing the infusion.

ADVANTAGES OF INFUSION PREPARED BY METHOD HEREIN DESCRIBED.

The infusion prepared in the manner described, in which 1 part of digitalis in No. 60 powder is treated with 100 parts of boiling water and kept for one hour in a boiling water-bath with frequent stirring, contains all of the active principles of the leaf. When this infusion is filtered and used therapeutically, the effects are the same as would be induced by the tincture in doses just one-tenth as large. If one desires the cinnamon flavor, this may be secured by adding 1 Cc. of oil of cinnamon to 10 Gm. of the powdered digitalis previous to the addition of the boiling water. Very little of the volatile oil is lost during the process of preparing the infusion.

An infusion thus prepared has these advantages over one made according to the present Pharmacopoeial method:

1. There is better extraction, whereby the infusion represents the activities of the drug completely.
2. There is uniformity of activity, in place of the variability of the official.
3. With a given degree of activity it contains a larger proportion of the slightly soluble but more readily absorbable, digitoxin or digitoxin-like substance, or substances.
4. The dosage is just ten times that of the tincture in volume.
5. The filtered infusion is transparent.
6. It may be kept indefinitely without loss of activity.

STABILITY OF INFUSION.

We are not at present concerned primarily with the question of the stability of the infusion, but we wish to correct some erroneous views that are prevalent concerning the question, for it is useless to show the way to make an infusion properly if the preparation is valueless, because of the rapidity with which it decomposes, as some believe.

No one denies that the infusion of digitalis decomposes under adverse conditions—like all other infusions of drugs that contain no antiseptic—but the question that concerns the clinician, who, for any reason, prefers to employ the infusion,

is whether it can be prepared conveniently in a reasonably stable form. Hatcher and Eggleston[1] have shown that the infusion of digitalis prepared in the manner recommended here, and filtered while hot, retains its activity with little change for several weeks when kept with reasonable care. We are able to offer evidence confirmatory of this conclusion.

One of us (R. A. H.) prepared an infusion of digitalis in the manner described, using 1 part of the powdered leaf to 100 parts of boiling water, filtering the infusion while hot, putting it into bottles which it filled completely, corking these, and sealing them with paraffin, Feb. 5, 1918. Specimens of this infusion have been tested on cats from time to time, and no perceptible loss of activity could be detected at the time of the last examination. A slight precipitate has formed in every bottle, leaving the supernatant fluid perfectly transparent, and in a few there has been a growth of mold, owing to imperfect sterilization of the corks.

THERAPEUTIC EFFECTIVENESS.

Dr. Cary Eggleston used a specimen of this infusion clinically, July 28–29, 1920, and found the dose required to induce the typical therapeutic effects to be the equivalent of that which he had established for the tincture as measured in terms of cat units. A condensed report of the essential facts are presented here through the courtesy of Dr. Eggleston. The apex rate was 145, and the radial pulse rate was 73, the pulse deficit being 72 after two days' rest in bed; the infusion was then administered at 12 midnight, 6 A.M. and at 12 noon. The apex rate was reduced to 104; the radial pulse rate rose to 86, the deficit being 18, shortly before the last dose. The condition steadily improved and the pulse deficit had nearly disappeared within four hours after the last dose, and on the following morning this deficit had disappeared, completely, the rate being 66.

The condition of the heart, as shown by the pulse deficit, was worse at the time the first dose of the infusion was administered than it had been twenty-four hours before, showing that rest in bed alone was not producing any improvement. The striking improvement that occurred within less than twelve hours hardly leaves room for doubt concerning the therapeutic effectiveness of this specimen of infusion that had been prepared nearly two and a half years previously. The infusion was filtered before being used, showing that the precipitate had not carried down the active principles in an insoluble form.

SUMMARY.

1. Tincture of digitalis was prepared, the marc of which was dried and used in the preparation of an infusion; this infusion of marc was tested on cats and found to be inert, showing that all of the active water-soluble principles of the leaf are extracted during the percolation for making the tincture.

2. This method of testing the marc affords a delicate means of testing the degree to which the active water-soluble principles are extracted during the percolation of the drug.

3. There is no essential difference in the amounts of the saponin bodies present in the tincture, and in the infusion prepared from equal weights of the leaf, and therapeutic doses of digitalis do not contain enough to induce any undesired effects.

[1] R. A. Hatcher and Cary Eggleston, "The Stability of the Infusion of Digitalis," *J. A. M. A.*, 65, 1902 (Nov. 27), 1915.

4. Infusions of digitalis were prepared in different ways. In each case the marc was washed and dried, after which it was used for the preparation of tincture, and this tincture was tested on cats in order to determine to what extent the active principles had been extracted during the preparation of the infusion.

5. The official infusion does not represent the drug completely; hence the standardization of the leaf does not insure uniformity in activity of the infusion. The variability of the infusion is at the expense of the more absorbable of the active principles.

6. The infusion prepared according to the simple method described represents the activities of the leaf completely; hence it permits of uniformity when a standardized powder is used for making it. It may be used in place of the tincture in doses just ten times the volume of those of the latter, and it becomes a matter of indifference, so far as therapeutic effects are concerned, which is used.

7. We have been unable to discover any experimental evidence to support the view, still held by many, that there is a necessary qualitative difference between the actions of the tincture and those of the infusion of digitalis, even when the latter is prepared properly.

8. An infusion of digitalis prepared in the manner recommended, and kept in completely filled and hermetically sealed bottles for more than two years and five months, retained its activity unimpaired, as shown by the results of tests on cats and by the therapeutic effects on man.

DIAGNOSTICAL ELEMENTS IN DRUG ANATOMY AND THEIR NOMENCLATURE.

BY THEO. HOLM, CLINTON, MARYLAND.

For several years the writer has been engaged in studying the morphology and anatomy in general of our native medicinal plants with the purpose of presenting the results in book form. Owing to the present extraordinarily difficult conditions relative to the publication of such work, involving many illustrations and quotations from similar works in foreign languages, there seems, at present, no possibility of securing a publisher to undertake the publication. Meanwhile, a tenth revision of the Pharmacopoeia of the United States is being prepared, and being well acquainted with the botanical part of the ninth revision, I thought that some suggestions relative to the diagnosis of a few drugs might prove useful to the collaborators.

In dealing with anatomical diagnoses of drugs as presented in the Pharmacopoeia I wish to point out that the distinction between root and root-stock (rhizome) is not always correct, causing erroneous statements as to the internal structure. Moreover, the structure itself is very often so poorly defined that it would be absolutely impossible to identify the drug in question by means of the structure quoted. We must, as a matter of fact, bear in mind that plant anatomy has developed to a remarkable extent during the last decennial; thus, structures formerly considered peculiar to certain genera are known now to be common to many others, besidethat several new characteristic structures have been discovered, which *ad interim* are considered peculiar to some few families or genera. In other words, the anatomical characterization offered in the U. S. Pharmacopoeia might be made more helpful to

the student of pharmacognosy if the morphological structure were defined somewhat more precisely, and the anatomy of the drugs were considered from a more modern point of view.

Last, but not least, the botanical terminology used in the Pharmacopoeia is, in several cases, not in conformity with the one recently adopted and so excellently outlined in the comprehensive works of Haberlandt, Schwendener, and Strassburger; for instance:—fibro-vascular bundles, wood-fibers, phloem, xylem, schlerenchyma, bast-fibers, sclerenchymatic fibers, etc.

These various terms were formerly used to designate the elements of the conducting as well as the mechanical system in plants, but somewhat indiscriminately, and not in accordance with physiological botany. It was Nägeli who introduced the term fibro-vascular bundle, and in this way the mechanical and conducting tissues were combined so as to represent one anatomical element, although they are not only physiologically distinct, but, moreover, they often occur as separate tissues, not connected with each other. De Bary proposed the term vascular strand, thus excluding the mechanical tissue, and by this author the terms sclerenchyma, phloem and xylem were adopted, and these terms have been in use for many years. But since then Schwendener and Haberlandt have proposed some other terms, which have been unanimously accepted by the leading authors of works dealing with anatomy and physiology. By Schwendener the terms stereome and stereids were proposed instead of schlerenchyma and sclereids, but he retained collenchyma and libriform (Sanio), the latter applying to internal stereome, located in the stele. Schwendener, moreover, proposed the term mestome, for the phloem and xylem alone. Finally, Haberlandt introduced the terms leptome and hadrome for phloem and xylem, and these terms are now more or less generally accepted, as a review of the publications of recognized botanical anatomists, both in this country and in Europe, indicates. According to Haberlandt a complete mestomestrand thus contains the elements as follows:—leptome = sieve-tubes, companion-cells, cambiform and leptome-parenchyma, and *hadrome* = tracheae, tracheids and hadrome-parenchyma.

The term "endodermis" applies to the innermost stratum of the primary cortex in roots as well as in stems. Oudemans is the author who proposed this term. The pericambium (Nägeli and Leitgeb) is the tissue, mostly of a single stratum, located inside the endodermis in roots; the function of this tissue is to develop lateral roots, as well as cork and secondary cortex. Van Tieghem and Douliot proposed the term pericycle for not only the pericambium in the roots, but also for the more or less complete stereomatic sheath inside the endodermis of the stem. Finally, the term stele has been proposed by Van Tieghem instead of "Central-cylinder," and the term applies only to the tissues inside the cortex, and endodermis in stems as well as in roots.

The terms phellogen, periderm and cork are sometimes used in the Pharmacopoeia, but not always in the proper way. It must be remembered that periderm applies to the superficial protective tissue, which replaces the epidermis in stems, which increase in thickness. This tissue, the periderm, is composed of two elements: the cork and the phellogen; of these the latter represents a kind of meristem from which the cork becomes developed; cork may, however, also be devel-

oped from the pericambium in roots of Dictyledons and Gymnosperms. When thus the cork arises from a deep-seated phellogen the peripheral tissues necessarily become deprived from conduct of water and dry up, and such dried parenchymatic tissue, belonging to the cortex, is called "Borke" by the Germans. The history and definition of these terms are to be found in various works.[1]

To illustrate these various points the examples which follow may be sufficient:—

Podophyllum.—(U. S. Pharmacopoeia p. 329.) The diagnosis reads:—"Under the microscope, a transverse section of the rhizome of Podophyllum shows an outer layer of one or two rows of reddish brown cells; parenchyma of cortex and pith with numerous single, spherical, polygonal, or 2 to 6 compound starch grains, or rosette aggregates of calcium oxalate; vascular bundles from 24 to 34, arranged in a circle between cortex and pith."

There is not a single point in this diagnosis which conveys to the reader the somewhat singular structure of the rhizome of this plant. The diagnosis should be written as follows:

> "Under the microscope, a transverse section of the rhizome of Podophyllum shows a thin-walled cork of a brownish color, a thick-walled cortex with starch of large and small grains; endodermis and pericyclic sterome absent; mestome-strands about 30, collateral, arranged in an almost circular band, with the large hadrome V-shaped; some few mestome-strands near the periphery of the rhizome containing mostly leptome and cambium; pith large, thin-walled, with aggregated crystals of calcium oxalate."

So long as the drug often contains some roots, the structure of these in connection with the rhizome may be helpful to the identification, *viz.:*

> "Secondary roots strong, but increase in thickness confined to the stele, most often pentarchic; cortex and pith broad, endodermis thin walled."

Cimicifuga.—(U. S. Pharmacopoeia, p. 111.) The diagnosis in the Pharmacopoeia of the rhizome does not give the essential structural points, as for instance: "the absence of endodermis and pericycle, the very deep rays of hadrome, destitute of libriform." And with regard to the roots, these show a most characteristic structure by the 4 to 6 mestome strands alternating with the very distinct 4 to 6 groups of proto-hadrome vessels, and separated from each other by a very broad secondary cortex. Moreover, it is characteristic of the structure that the increase in thickness does not involve the throwing off of the epidermis or the primary cortex; endodermis with numerous radial cell-divisions. By comparing the rhizomes with the roots of Podophyllum, Jeffersonia and Caulophyllum with Cimicifuga, Cimicifuga may be distinguished at once by the roots containing a secondary cortex. None of these points are brought out in the Pharmacopoeia.

Hydrastis.—(U. S. Pharmacopoeia p. 224.) There is no real diagnosis of the rhizome, which exhibits quite a peculiar structure, notably on account of the col-

[1]S. Schwendener, "Das mechanische Princip in anatomischen Bau der Monocotylen," Leipzig, 1874. G. Haberlandt, "Physiologische Pflanzen-anatomie," Leipzig, 1896. (2nd Edition). J. C. Schoute, "Die Stelärtheorie." Groningen, 1913. H. Solereder, "Systematische Anatomie der Dicotyledonen," Stuttgart, 1899.

lateral mestome-strands being arranged in a single circular band, with deep rays of secondary hadrome, embedded in a large, thin-walled parenchyma, but with neither endodermis, pericycle, nor interfascicular cambium.

Aristolochia Serpentaria.—(U. S. Pharmacopoeia p. 374.) The diagnosis in the Pharmacopoeia is so incomplete that it does not show the structure of a rhizome at all. There is a cortex, of which the hypodermal stratum is collenchymatic, and the cells contain chlorophyll and oil. The stele consists of a thin-walled endodermis, and a stereomatic pericycle surrounding about 10 collateral mestome-strands separated from each other by very broad rays of parenchyma, and connected with each other by strata of interfascicular cambium; the pith is excentric.

Stillingia.—(U. S. Pharmacopoeia p. 410.) The following, and most important characters, are not mentioned in the Pharmacopoeia:

> "Laticiferous ducts abound in the secondary cortex: Stereids is present in the primary leptome; thickness of the roots depending on the numerous layers of cork, secondary cortex and secondary hadrome."

Gelsemium.—(U. S. Pharmacopoeia p. 201.) The remarkable structure of the cortex being divided into two zones by the endodermis and pericycle, as well as several other points, are not mentioned in the official diagnosis.

Sassafras.—(U. S. Pharmacopoeia p. 379.) In describing the bark no mention is made of the sclerotic cells forming longitudinal rows in the cortex nor of the large mucilage-cells, oil-cells, etc.

Finally, the diagnosis of Sarsaparilla (p. 369) seems to apply to a rhizome rather than to a root. What is meant by "a porous central-cylinder" in the root of Veratrum (p. 486) is very uncertain. Under Taraxacum (p. 438) mention is made of "laticiferous vessels and sieve-tubes alternating with parenchyma," which statement could be improved by replacing the words "vessel" with "ducts" and "alternating" with "separated by."

As the drugs are described in the United States Pharmacopoeia, their identification by structure alone is hardly possible, for in too many cases the structure has not been given so as to show the most essential points, besides the botanical terms have not always been applied in the proper manner. It would be a great help to the students of pharmacognosy if the Pharmacopoeia contained some glossary of botanical terms explained in a few words, and some figures illustrating the most important features of the drugs in question, especially the anatomical structure.

DRUG TOPICS.*

BY J. A. BAKER.

No. 4. Bleached Coriander.[1]

At the request of Dr. R. H. True, at that time in charge of the investigations of drugs and medicinal plants for the Bureau of Plant Industry, the study of bleach-

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* From the Laboratory of Edward Kremers.

[1] Extracts from J. A. Baker, "The Bleaching of Drugs," Thesis, University of Wisconsin, 1911.

ing coriander was undertaken in connection with the cultivation experiments of this drug at the Northern Station for the Cultivation of Medicinal Plants, located at Madison.

In connection with the preparation of food-stuffs, bleaching agents are used not only for the purpose of bleaching but also for the purpose of killing germs. This problem involves not only the question of the honesty of the label, but sanitary questions as well.

In the case of drugs it may be a matter not only of honesty of label, but also a question of quality. Thus, *e. g.*, in the case of coriander, a bleached coriander certainly presents a more favorable appearance. Whether such a coriander has the same agreeable flavor as the unbleached drug is a question that does not appear to have been decided as yet. Whether a slight bleaching of the pericarp will affect the volatile oil chemically so as to produce a difference in its physical and chemical constants, can be decided only by experiment. Whether the aroma may have been changed without a corresponding change in the more or less flexible limits of the physical and chemical constants is a question of judgment rather than experiment and by no means as easy of a satisfactory solution.

In order to ascertain in a general way to what extent the practice of bleaching is carried on, letters were addressed to expert pharmacognosists attached to the principal ports of entry.

From Dr. H. H. Rusby, who at the time was attached to the New York Laboratory, established under the Pure Food and Drugs Act, the following statement was received:

"I am awfully sorry that I cannot help you to the information asked for in your letter of the 20th. The truth of the matter is that I have practically no knowledge of the bleaching of drugs, except that of general hearsay. It is generally accepted as a fact that dark colored Tragacanth is bleached, also pealed Calamus, Coriander, Cardamom, etc. You will find a brief note about the bleaching of Cardamom in the National Dispensatory. You probably know that Chondrus is bleached by the action of the sun and air, while moistened with sea water, but I should not be surprised if it was sometimes bleached with sulphurous acid.

"I have never seen any drugs bleached and know nothing of the details."

From Dr. Albert Schneider, at the time pharmacognosist for the Port of San Francisco, the following statement was received:

"If you mean by 'bleached drugs' such as have been subject to some bleaching process as sulphuring, etc., I may state that none such are presented for entry at the Port of San Francisco, at least none have come to my notice thus far."

From Dr. E. Gildemeister, Chief Chemist for Schimmel & Co., in Miltitz near Leipzig, who has had considerable experience with enormous quantities of crude vegetable drugs from all parts of Europe and whose knowledge of the subject, therefore, seemed extremely valuable, the following answer to several questions was obtained:

"In Beantwortung Ihrer Anfrage vom 10.2.11. kann ich ihnen mitteilen, dass uns ueber eine kuenstliche Bleichung von Coriander und aehnlichen Saemereien nichts bekannt ist. Bei Coriander ist die Ausfuehrung eines derartigen Prozesses auch sehr unwahrscheinlich, denn dabei wuerden die beiden Fruchthaelften zu leicht auseinanderfallen und die Waare sehr an Wert einbuessen. Wir haben sehr helle Faerbungen bei einigen Sorten, besonders bei Marokkanischem Coriander beobachtet, damit ging stets ein sehr niedriger Oelgehalt Hand in Hand. Beides glauben wir auf die intensive Wirkung der Marokkanischen Sonne zurueckfuehren zu muessen.

Von kuenstlich mit SO_2 behandelten Drogen sind uns bishaer nur Iris und Hopfen begegnet, die beide dann fuer die Destillation unbrauchar werden, vgl. G. u. H. S. 395 u. 437."

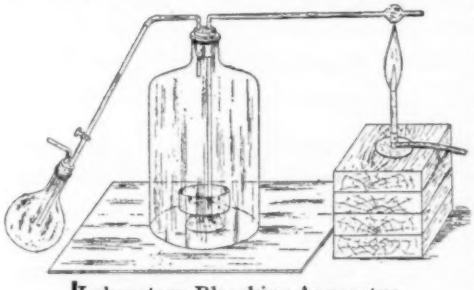
As already pointed out, the light colored imported coriander was suspected of being bleached, by Dr. True. However, the literature on bleaching as well as on coriander affords no reference to the subject, neither could anything be learned about it from importers of drugs, manufacturers of volatile oil, or government drug inspectors.

In order to ascertain something about the effect of bleaching on the appearance of the drug, also on the character of its volatile oil, the following experiments were undertaken.

The first problem was to ascertain the minimum amount of sulphur dioxide or sulphurous acid that would bring about an improvement in the appearance that might be regarded as sufficient in trying to make a dark product more salable. For this purpose both dry bleaching and wet bleaching were tried with 100 gramme lots of coriander raised in the Northern Station for the Cultivation of Medicinal Plants, a station maintained at that time as a coöperative experiment between the U. S. Department of Agriculture and the University.[1]

Dry Bleaching.

In order to ascertain the effect of sulphur dioxide a simple apparatus was constructed. As a receptacle for the coriander to be exposed, a desiccator without a cover was used. Above the contracted part a false bottom was placed so that the coriander occupied the upper half only. A weighed amount of sulphur was slowly burned in a bulb tube of hard glass in such a manner that the vapors were drawn by a suction pump into the bottom of the desiccator and had to pass through the layer of coriander. In order to prevent loss of sulphur dioxide the desiccator was covered by a bell-jar resting air-tight on a glass ground plate. The current of sulphur dioxide was regulated by a stopcock whereas the flask filled partly with water served as a means of counting the bubbles of air and thus regulating the current of sulphur dioxide.



Laboratory Bleaching Apparatus.

The amounts of sulphur used and the effect produced on the coriander by the sulphur dioxide are recorded in the following table. One part of sulphur, upon combustion, yields practically two parts by weight of sulphur dioxide.

Expt.	Amt. of sulphur.	Changes in appearance, etc. of coriander.
1	1 gramme	No striking change in color. Faint odor of SO_2.
2	2 grammes	Color change very striking. Strong odor of SO_2.
3	4 grammes	No perceptible difference between Nos. 2 and 3. Strong odor of SO_2.
4	2 grammes	Same as No. 2. Strong odor of SO_2.

Two grammes of sulphur changed the color of coriander from a dirty hue to a pleasant yellow, which color was by no means improved by doubling the amount of sulphur. One-half of the amount of sulphur, however, did not produce a like-

[1]See Annual Report for 1910. "Coriander."

desired effect. In all cases the odor of sulphur dioxide lingers long with the product. The bleaching effect also was slow.

Wet Bleaching.

In order to ascertain the effect of sulphurous acid, *i. e.*, of sulphur dioxide in aqueous solution, on the coriander, 100 Gm. amounts were covered with dilute aqueous solutions of sulphurous acid for the short period of one minute. The coriander was then dumped into a funnel so that the sulphurous acid would drain off at once. The fruit, having taken up some water, was dried back, by exposure to room temperature, to 100 grammes. The results of these experiments are also recorded in tabular form.

Expt.	Amount of SO_2 sol.	Percentage of SO_2 in sol.	Amt. of sol. absorbed or lost.	Loss of SO_2.
1	500 Cc.	3.55 p. c.	50 Cc.	0.68 p. c.
2	450 Cc.	2.87 p. c.	40 Cc.	0.37 p. c.
3	410 Cc.	2.50 p. c.	60 Cc.	0.33 p. c.
4	350 Cc.	2.17 p. c.	...	.....

Although somewhat varying amounts of solutions of different strength were used, the effect as to the appearance was practically the same in all cases, thus showing that a 2 percent solution, corresponding to 1 gramme of sulphur, will produce as desirable an effect, as to appearance, as will one of almost twice the strength. Moreover, these experiments show that one-half of the sulphur dioxide in the wet state, *i. e.*, an aqueous solution of sulphurous acid, will produce a better looking product after a minute's exposure than twice the amount of dry sulphur dioxide will after an exposure of twenty-four hours or even several times twenty-four hours.

Effect of Bleaching on the Oil.

In order to ascertain to what extent, if any, the sulphur dioxide or sulphurous acid affects the volatile oil, for the aroma of which coriander is largely used, the volatile oil from bleached and unbleached coriander was prepared.

13.75 lbs. of coriander, which after grinding weighed 13.50 lbs. (= 6124.43 grammes), were subjected to steam distillation in the Lentz distilling apparatus of the University with steam under about 15 lbs. pressure. The oil obtained from this unbleached coriander weighed 11.325 grammes, corresponding to a yield of 0.185 percent. According to Gildemeister, the volatile oil content of coriander varies considerably as to geographic source, all the way from 0.1 p. c. to 1 p. c.[1]

Its sp. gr. was 0.863 at room temperature whereas the U. S. P. calls for a sp. gr. of 0.875 at 25° C. In a 50 mm. tube it deviated polarized light 5°47′ to the right. The U. S. P. calls for a dextrogyrate angle of rotation varying from 7° to 14° in a 100 mm. tube and G.-H.-K., "The volatile oils," from +8° to +13°.

A like amount of seeds were then bleached for one minute with a 1 percent aqueous solution of sulphur dioxide. After drying, these were ground and distilled. As the first vapors came over, a strong odor of sulphur dioxide was perceptible, but no oil was obtained even upon cohobation of the aqueous distillate. The latter, however, had a very pleasant odor.

[1] Moravian, Thuringian and Russian, 0.8 to 1.0 p. c.; French, 0.4 p. c.; Dutch, 0.6 p. c.; Italian, 0.5 p. c.; Moroccan, 0.2 to 0.3 p. c.; East Indian, 0.15 to 0.2 p. c.

NOTES ON THE ASH YIELD OF GENTIAN.

BY C. E. SMYITHE AND E. L. NEWCOMB.

Gentian is a drug which is deserving of a much more extended study than has as yet been accorded it. The low normal ash yield is particularly interesting. Ordinarily, one would expect to find in a drug consisting chiefly of parenchyma tissue rich in protoplasmic constituents, a relatively high ash. On the other hand, woody tissue in abundance and with little calcium oxalate is usually indicative of a low ash. In the latter case, Licorice seems to stand out as a prominent exception.

Gentian contains no calcium oxalate and is composed chiefly of parenchyma tissue. The cells are rich in organic constituents. Qualitative and quantitative determinations of the ash yielded by our different drugs should be made. Such studies would no doubt throw much light on the nature of many of these complex substances.

We report herewith the results of a series of examinations to determine the total amount of ash yielded by various commercial samples and the amount of the ash which is soluble in 5% hydrochloric acid. The results also include figures obtained when the samples were specially treated in order to remove practically all foreign matter, such as sand, clay, etc. A subsequent report will present a method for quickly removing such foreign material by machinery and include ash percentages of the cleaned drug and of the dirt containing portion separated.

Our present results are tabulated herewith as follows:

Sample No.	Source of sample and remarks.	Percent total ash.	Percent insoluble in 5% HCL.
1.	Commercial powdered, in carton, purchased in 1920	3.33	0.64
		3.26	0.61
2.	Commercial powdered, in carton, purchased in 1918	3.13	0.66
		3.17	0.83
3.	Ordinary commercial whole drug, garbled to remove coarse foreign matter but not specially cleaned to remove sand or clay. Bought in 1920. Powdered in this laboratory	4.10	....
		4.12	....
		4.01	1.53
		3.79	1.36
4.	Commercial powdered, from stock, no date, probably purchased from local source	4.74	2.46
		4.79	2.59
5.	Commercial powdered, from stock, no date, probably purchased locally	2.95	0.77
		3.00	0.89
6.	Commercial powdered, from stock, no date, probably purchased locally	3.12	....
		3.13	0.35
		3.081	0.41
		3.103	0.485
7.	Commercial powdered, in tin, purchased in 1920	3.84	1.30
		3.51	1.37
8.	Commercial powdered, in carton, purchased in 1920	7.22	3.30
		7.31	3.52

9.	Select whole drug, bought 1920, dried, brushed with hand brush, powdered in this laboratory	2.89	0.76
		2.94	0.98
10.	Select whole drug, bought 1920, dried, brushed with hand brush, powdered in this laboratory	3.03	0.87
		3.05	0.64
11.	Select whole drug, bought 1920, dried, brushed with hand brush, powdered in this laboratory	2.34	0.61
		2.43	0.79
12.	Brushings from No. 9, above	24.03	20.67
13.	Brushings from No. 10, above	16.53	13.05
14.	Brushings from No. 11, above	19.52	16.15
15.	Leaf and stem remains and young leaves separated by grabling, powdered in this laboratory	5.656	1.264
		5.802	1.538

These results show that the normal ash, *i. e.*, the ash of the thoroughly cleaned drug, is between 2 and 2.5 percent. Commercial samples usually contain between one-half and three percent of foreign inorganic matter, insoluble in 5% hydrochloric acid.

DEPARTMENT OF PHARMACOGNOSY,
COLLEGE OF PHARMACY,
UNIVERSITY OF MINNESOTA.

DETERMINATION OF SODIUM BENZOATE IN OLEOMARGARINE.

BY EDWARD D. DAVY.

After trying the methods recommended for the determination of Benzoate in fatty products without concordant results, the writer devised the following method by which one may check results within one one-hundredth percent. The method is also applicable to other fatty substances than oleomargarine.

Take 100 grammes of sample, treat with 50 mils of saturated salt solution containing approximately 0.5% of sodium hydroxide. Add phenolphthalein indicator and heat to boiling, adding a solution of sodium hydroxide if necessary to maintain alkalinity. Stir vigorously and transfer to a separatory funnel while hot and separate the aqueous layer. Repeat this operation five times. (Test has shown this to be sufficient.)

Filter the combined liquids with suction and to the filtrate add 4 grammes of sodium hydroxide and an excess of calcium chloride, an excess over that necessary to combine with the fatty acids. Calcium hydroxide is also precipitated which forms a very efficient filter bed. Again filter by suction.

Acidify the filtrate with hydrochloric acid and shake out five times with ether, using 15 mils each time. Wash the combined ether extractions with water and evaporate spontaneously. Dissolve the benzoic acid in neutral 50% alcohol and titrate with $\frac{N}{10}$ alkali, phenolphthalein indicator. Some albuminous matter is extracted by the ether but this in no way interferes with the titration.

The number of mils required for titration multiplied by 0.0072 gives the weight of Sodium Benzoate in 100 grammes of sample.

SHALL THE COLLEGES TEACH AND THE BOARDS EXAMINE IN COMMERCIAL PHARMACY, JURISPRUDENCE AND LATIN?*

BY JACOB H. REHFUSS.

In the year 1917 the New York State Board of Pharmacy recommended to the Board of Regents of the State Department of Education that candidates for pharmaceutical licensure be examined in a sixth subject to be known as Commercial Pharmacy, Pharmaceutical Jurisprudence and Pharmaceutical Latin. The recommendation was adopted by the Board of Regents at a subsequent meeting and since January 1918, this subject has been included in the examinations. The grouping of these three widely separated branches of pharmaceutical training under one heading was an arbitrary one rather than founded upon any basis of relationship, the main consideration being to bring within the scope of this new subject for examination sufficient material to make it the equivalent in importance to each of the other five subjects in which the board was already examining.

To the writer of this paper was assigned the task of getting up the first sets of questions and of rating the answer papers.

A NEW FIELD.

The field was a new one inasmuch as no other State board had undertaken a similar examination and there was, therefore, nothing to serve as a guide to the examiner which might show him how far to go into the subjects.

This was particularly true of commercial pharmacy. The second edition of the Pharmaceutical Syllabus, on page 152, defines the subject and outlines the course of instruction to be given in our colleges of pharmacy, yet the answer papers of the candidates in the early examinations showed that there was a wide variation in the manner and extent to which it was being taught. This may be accounted for, first, by a lack of proper textbooks; and, second, by the unlimited scope of the subject which permits the individual teacher to use his own discretion as to what parts of the subject shall receive attention, resulting in the omission of some matters that may be regarded as important and an ill proportioned stressing of other matters that are little needed by the pharmacist.

SOME PROPOSED QUESTIONS.

Before making up the first year's examination questions appeals were made to various sources for specimen questions. Some responses indicated that the writers kept strictly in mind the practical needs of the average retail pharmacist, and there were other replies which left the impression that our future pharmacists should be equipped to become efficiency experts or world statesmen.

To illustrate these extremes I will quote from a page of specimen questions submitted by one correspondent:

29. What relation has the prescription department to the rest of the store in a commercial way? Why in your judgment are there not more prescription departments successful financially?

30. How would you arrive at the expense account of your prescription department and what would you include in those expenses?

31. How in your judgment could economy be practiced in a drug store without in any way cheapening the service? State in detail what this economy consists of.

*Read before New York Branch A. Ph. A., April meeting, 1921.

32. Commercially considered, should the pharmacist manufacture his own galenicals and special preparations, or should he buy them? Give your reasons.

33. Explain why a drug store doing a good business does not always show a good substantial net profit.

34. How would you arrive at your gross profit? Your net profit?

35. To be successful, how often should you turn over your stock during the year?

36. What is a safe limit of expense and what do you include in that expense?

37. What is necessary to build up and retain a good cigar business?

38. What is necessary to build up and keep up a good soda business?

39. What points would you consider most important in selecting a site for your new drug store?

40. What system of accounting would you use in your store?

It is obvious that the above furnishes some excellent material for a commercial pharmacy course, but what shall we say of the questions which immediately follow these and which were recommended by the same writer?

41. Explain briefly the following: wealth, capital, income, marginal utility, marginal productivity, consumers' surplus, elastic demand, marginal cost, marginal producer, diminishing return.

42. Distinguish clearly between large scale production and monopoly, speculation and gambling, horizontal and vertical combination, capital and capitalization, corporation and partnership, value and price, trust and corner, joint cost and joint demand, money and credit, redemption and retirement of paper money.

43. Explain the causes which tend toward large-scale production and under what conditions the small retailer may hope to survive.

44. Show that the demand for any commodity is composed of a series of demands and may be represented by a curve. Illustrate how the demand may be changed by advertising.

46. Explain the determination of competitive market price under conditions of constant cost, increasing cost and decreasing cost.

49. Show the relation between the volume of money and credit and the general level of prices. Give illustrations.

50. Give three arguments for and three arguments against international bimetallism.

51. Discuss the feasibility of a system of inconvertible paper money.

53. Give an outline of the banking system of the United States under the Federal Reserve Act.

54. Explain the origin of financial and industrial crises, and show how the business man can guard against them.

57. (*a*) Distinguish clearly between rent, interest, profits, and wages. (*b*) Show how the marginal productivity theory applies to the determination of each of these shares.

58. Give three arguments for and three against the single tax proposal of Henry George.

There is great need of a conference of those who teach commercial pharmacy in the colleges of the State to take up the work of standardizing the subject so that uniform instruction may be given in all the colleges; to confine this instruction to those matters directly related to the conduct of a pharmacy. One very remarkable fact has been revealed in rating the answer papers in this branch and that is the lamentable ignorance shown by many of the candidates in answering questions involving simple mathematics, cumulative interest calculations, discounts, a correct comprehension of what is meant by such terms as gross and net profits, the percentage cost of doing business and such other problems whose correct solution is largely dependent upon straight thinking.

It might be contended that we have a right to assume that the high school graduates when they enter our colleges of pharmacy have been taught and should know these things, but since we find they do not and that they are essential to the

successful conduct of a pharmacy, are we not justified in making them a part of our licensing examinations?

The subject of pharmaceutical Latin is one that needs very little consideration here other than to state that it seems to have been taught in all the colleges to the extent outlined in the pharmaceutical syllabus with a due regard for and a proper conception of the pharmacist's need for Latin. Fortunately standard text books are available for the guidance of the teachers and apparently are used. It is to be noted, however, that in the early examinations it was evident that the candidates had not attached enough importance to this branch of their training, being especially deficient in the translating of the Latin directions on prescriptions. This condition has improved and in the later examinations better results were obtained.

In the case of pharmaceutical jurisprudence there is pretty much the same condition that we meet with in commercial pharmacy. Lack of proper textbooks and lack of uniformity in the teaching of the subject are apparent, judging by the answer papers of the candidates.

A MATTER OF SCOPE.

There should be no difficulty in coming to an agreement as to the scope of this subject. It is obvious that the future pharmacist must have an accurate knowledge of all the laws and regulations pertaining to the dispensing of medicines, more particularly the State pharmacy laws and the rules of the board of pharmacy; the federal and State narcotic laws and regulations; the federal and State liquor laws and regulations; the federal and State pure food laws; and, in the larger cities, the local board of health regulations respecting the sale of medicines. He needs also to have a general knowledge of common law and equity, particularly as they relate to everyday business procedure. The candidates have not shown very satisfactory results in their examinations in this subject. They do not seem to have a precise knowledge of these laws although it is a part of the curriculum of every college of pharmacy in the State. This is not to be regarded as a criticism of the teachers of pharmaceutical jurisprudence; due consideration must be given to the fact that these candidates have been influenced to a large extent by the manner in which the various laws have been observed in the pharmacies where they have been employed while attending college. They had absorbed more of what they had seen in practice than what they had heard in the lecture room.

With the ever increasing number of laws affecting pharmacy which have come into existence in the past few years there has naturally been resultant confusion and only those who follow all legislation closely can hope to conduct their pharmacies even approximately in strict compliance with the law. Herein lies a great opportunity for the teachers of pharmaceutical jurisprudence to get together and dedicate themselves to the task of making a compilation of these laws and regulations affecting pharmacy with the view of securing their publication, to serve not only as a textbook for the student but as a guide for the practicing pharmacist who in all probability did not have the advantage of a course in pharmaceutical jurisprudence when he attended college.

They might go even farther and take upon themselves the task of solving some of the problems that are involved in conditions which at present threaten the reputation and stability of pharmacy. I refer specifically to the disgraceful condition of ex-saloon-keepers being permitted to secure store licenses to open pharmacies ostensibly for the sale of drugs but in reality for the sale of whiskey, and there is no provision in the pharmacy law today to stop it. It may not be out of place here to offer the opinion that any legislative remedy sought for this condition lies not in the amendment of the State Pharmacy Law but rather in an amendment to the State Excise Law prescribing how and by whom beverage spirits may be sold. If it was required that the holder of a license or permit to dispense beverage spirits on prescription must be a licensed pharmacist and the sole owner of the pharmacy a stop would be put to this abuse of the privileges granted our profession.

In conclusion the writer desires to express the view that the board of pharmacy examination in this sixth group of subjects has brought about a broader teaching of them in our colleges and has compelled the students to give them the serious attention they have always deserved.

The result will be that the coming generation of pharmacists will be better business men, more law-abiding citizens because of their intimate knowledge of the laws pertaining to their profession, and better able to give to the public that expert service expected of all professions.

A FEW FUNDAMENTALS OF COMMERCIAL PHARMACY.

BY P. HONOROF.

In the absence of a definition for Commercial Pharmacy, some of the functions included or listed may be considered. Here opinions will differ. I name cleanliness first. It is an economic necessity, a moral duty, and an essential of success to have a Pharmacy clean. I suggest that a course in Pharmacy include instruction in the handling of the three brushes—the window brush, the floor brush and the bottle brush. The ability, knowledge and willingness to handle the aforementioned brushes will, in most cases, contribute to the success of the retail druggist.

This does not mean the turning of a pharmacist into a porter; the application is, when show windows are clean the pharmacist will most likely display some of his wares, which, no matter what they are, will attract the passerby's attention, and the latter will very soon habitually look for the window display. Therefore, through intelligent handling of the window brush one will soon indulge in window trimming, which gives consideration to all sides of the business and will have a wonderfully stimulating effect on the commercial as well as the professional part of it.

The Floor Brush.—The knowledge and desire of handling the sweeping implement will assist greatly on the inside appearance of the store. When people come into a public health institution, they expect it to be somewhat superior to the ordinary mercantile establishment—the first guide to health is cleanliness.

The Bottle Brush.—Step behind the prescription counters of *some* drug stores. What are the characteristics of this most important and fundamental part of the business—the medical kitchen, where prescriptions are carefully compounded by

the pharmacist, to which the public, from time immemorial, has been accustomed to look as a life-saving department of the institution called a Pharmacy, and through which the side-lines often connected with the prescription counter are looked upon as better and more reliable than similar wares bought elsewhere.

In fact it is the spirit of pharmacy. Without this small space called the prescription room the store would not be called a drug store. Yet the fact remains that the stock, shelf bottles, fluidextract bottles, etc., of some stores are often not cleaned for months; dirt and filth are the dominant characteristics of the prescription rooms of such places. In my opinion, Board of Pharmacy inspectors should be clothed with authority to check up and grade the degree of cleanliness of stores, and give them the proper publicity, if deemed necessary.

Herbert Kaufman, the man who has done more to recreate downhearted humanity than any other writer, tells us that "Tomorrow's greatest asset is today's junk and rubbish." If Mr. Kaufman would take a trip through the cellars, back rooms and attics of *some* of our drug stores, he would find a world of "assets."

How many thousand dollars would be saved by the druggists if they were taught scientific bottle washing, and thus resurrect used bottles into usable ones for the dispensing of commercially used drugs such as turpentine, linseed oil, denatured alcohol, etc. It would mean not only the saving of dollars and cents, but it would also teach the young apprentice, and the recent pharmacy graduate, care and thrift.

When a professor of a reputable school of pharmacy "downed" his college toga and donned a white coat behind the counter of a retail drug store, he did not display any shrinkage of brain matter, but an abundance of it; he demonstrated broad vision and an ability to comprehend, grasp, and read the writing on modern Pharmacy's wall. He went out to see Pharmacy in action, in reality, in life; not as in the book. He has realized that if Pharmacy as a profession is to survive and create for itself a place among the family of professions, it must prove that it is of real public benefit, and the only way it can be done is by giving the apprentice and beginner in pharmacy a real training course.

The store experience, or internship as some choose to call it, must not be looked upon as giving the proprietor of the retail drug store cheap help. This sort of help is far from being cheap—really it is the most expensive. The proprietor is paying the beginner directly a wage for competence, and indirectly for his incompetence, negligence, and sometimes for misconduct. In some of the European countries apprentices work a period without pay, and even pay for the privilege of receiving the store experience. Their work is not limited to the brainy kind alone; they do everything there is to do, be it rubbing, scrubbing, or bottle washing. They are like those who choose a military career. Entering West point, their goal is a commanding position, but they must go through the training process, which includes keeping their rooms clean, cleaning and polishing equipment, currying their horses, etc.

We have read contributions in our pharmaceutical press from members of faculties that "The apprentice, who is content to work around a drug store polishing fountains, washing bottles, is brainless, and the store experience has no other value except to supply merchants with cheap help." I am certain that such unthoughtful

propaganda has no constructive value; it creates a feeling of dissatisfaction; it spreads seeds of antagonism; harmful to apprentice, clerk and proprietor. It leads to one thing, and that is sabotage.

Buying. We often see what would otherwise be a good-paying drug store turned into a failure, because the buyer, while a first-class pharmacist, was not aware of the fact that a dollar invested twelve times yields larger returns than twelve dollars invested once; that a six months' supply of one article takes exactly as much capital and room as thirty days' supply of each of six articles; yet the latter will show sales six times as great. Success in retail drug stores depends on the turn-over, not only because frequent turn-over brings better returns but because it keeps drugs fresh and salable.

Selling. The store—invitingly clean, its goods well displayed and with an unlimited amount of courtesy—will do the Selling.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and its branches shall become the property of the Association, with the understanding that they are not to be published in any other publications than those of the Association, except by consent of the Committee on Publication."—By-Laws, Chapter X, Art. III.

Reports of the meetings of the local branches should be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten, with wide spaces between the lines. Care should be taken to give proper names correctly, and manuscript should be signed by the reporter. To maintain its activity and representation each Branch should see that at least three of its meetings during the year are reported in the Journal.

BALTIMORE.

The May meeting of the Baltimore Branch of the American Pharmaceutical Association was held at the Emerson Hotel on Thursday evening, May 26, 1921, Mr. J. C. Krantz, Jr. presiding. The minutes of the April meeting were read and approved.

Dr. Hermann Engelhardt addressed the meeting on the subject, "The Evaluation of Vegetable Drugs." A brief abstract follows:

Vegetable drugs are assayed by two different methods, the *chemical* and the *physiological* or *biological* methods. In the chemical method that active principle or group of active principles is estimated which is present in the drug in the largest amount and which can be most easily and conveniently isolated; thus, alkaloids, glucosides, resins, esters, acids, volatile oils, etc., are determined. However, the other constituents of the plant, which up to the present time are considered as ballast or reserve products necessary for the up-building of the plant, are not estimated, although it has not been proven that they are therapeutically worthless. It is advocated that, whenever feasible, substances like quina-tannic acid, meconic acid, caffeo-tannic acid, etc., should be estimated also. Furthermore, it is not correct to estimate only the morphine of opium, because it has not been proven that the other alkaloids in opium are always present in the same proportion to the morphine. In assaying drugs chemically we can obtain only comparative or relative results, because it has never been proven that the amount of active principle estimated is in the same proportion to the therapeutic activity of the drug.

In the *pharmacological* or *biological* method we obtain relative results also, because the toxicity of the drug, the rise of the blood pressure, the contraction of the muscles or whatever may be determined, is, as far as we know, in no definite proportion to the therapeutic activity of the drug. Furthermore, we are still lacking that animal in which drugs produce the same action as in men.

Since by both the chemical and the pharmacological methods only relative results can be obtained it is suggested that only such methods be adopted by the United States Pharmacopoeia, National Formulary, etc.,

which can easily be carried out by every chemist and which should be economical, that is, require the smallest amount of substance; the methods should be rapid, sufficiently accurate without being too sensitive, and can be carried out without the use of expensive apparatus.

Miss Carrie G. Mossop presented a paper, "Gleanings over the Counter," bringing out in a pleasant manner the ludicrous and laughable things that are daily asked for in the average drug store. This paper was well received by those present and several members requested that more of these incidents be brought to the monthly meetings.

B. OLIVE COLE,
Secretary-Treasurer.

CHICAGO.

The 119th monthly meeting of the Chicago Branch of the American Pharmaceutical Association was held Friday evening May 27 at the University of Illinois School of Pharmacy Building with President C. M. Snow in the chair. There was a good attendance of members and friends.

Chairman Wm. B. Day, of the committee appointed to consider an exhibit of the Chicago Branch at the annual meeting of the Illinois Pharmaceutical Association, reported that it did not seem feasible for the Branch to prepare a specific exhibit for this meeting, but all members of the Branch were urged to present for exhibit such pharmaceutical apparatus, items of business equipment or other articles that are new to the drug trade, and that might prove of interest to pharmacists in attendance at the Illinois Pharmaceutical Association meeting.

Chairman H. N. Bruun of the Committee on Commercial Interests of the I. Ph. A. endorsed this report. He said that he welcomed assistance of this kind and that he believed the exhibit being prepared by his committee would prove very attractive to pharmacists. He stated further, that the exhibit was entirely in charge of his committee, and that the exhibit is to be for the sole purpose of instructing pharmacists in the use of these modern business appliances and pharmaceutical apparatus.

The principal paper of the evening was by Mr. L. E. Warren on the subject "The Chemistry and Therapeutic Properties of Chaulmoogra Oil." This excellent paper was splendidly presented and accompanied with a number of exhibits of the various kinds of seeds from which chaulmoogra oil is obtained; samples of the oil, chaulmoogric acid, and esters of this acid, also maps and charts were used in presenting the subject. The paper aroused much interest, general approval and considerable discussion. It was unanimously approved for publication in an early number of the JOURNAL.

After Mr. Warren's paper, Prof. A. H. Clark brought the meeting to a brilliant conclusion by presenting about fifty new, beautifully colored lantern slides of scenic and historic interest to A. Ph. A. members. As the pictures were all of his own taking, he was able to discuss them in a most pleasing way.

The next meeting of the Branch was announced for October 1921.

E. N. GATHERCOAL, *Secretary.*

DETROIT.

On the evening of Friday May 13 in the Wayne County Medical Society Building the Detroit Branch of the American Pharmaceutical Association concluded its series of meetings for the 1920–21 season.

Preceding the meeting an excellent dinner was served.

Being the last meeting of the year, reports from the officers and the chairmen of the various committees were read, all of which were exceptionally favorable. The general trend of expression was to the effect that we had an exceedingly successful year.

Officers elected for the ensuing year are as follows: Crosby B. Washburne, President; Harry L. Guffin, Vice-president; John C. Moore, Secretary; Frederick F. Ingram, Jr., Treasurer; Ernest R. Crandall, Chairman Program Committee; Walter M. Chase, Council Member.

The speaker of the evening was Howard T. Graber, whose two papers on the "Standardization of Rare Sugars" and the "Relation of the Dissociation of Hydrogen to Enzymic Activity" were attentively received and well appreciated.

CROSBY B. WASHBURNE, *Secretary.*

PHILADELPHIA.

The final meeting of the season of the Philadelphia Branch of the American Pharmaceutical Association, held May 10 at the Philadelphia College of Pharmacy and Science, was one of the most enjoyable and instructive of the past year.

Prof. F. P. Stroup gave a "Review of the Fashions in Chemistry," starting with the transmutation hopes of the alchemists and leaving us with perplexing thoughts on the ionic theories.

The work and theories of Boyle, Cavendish, Priestley and others were considered and compared with our present ideas of chemistry. Langmuir's electron theory was illustrated, and the dissociation of electrolytes in water and the effect on the hydrogen potential was discussed.

Many phenomena puzzling to the average pharmacist were explained by Prof. Stroup by his interpretations of the acid and alkaline reactions of apparently neutral salts and the evident inactivity of concentrated acids under certain conditions.

Messrs. C. H. LaWall, Louis Gershenfeld and J. Atlee Dean participated in the discussion.

Mr. Ambrose Hunsberger presented a motion providing for resolutions on the death of Prof. H. P. Hynson. The motion carried unanimously, also a vote of thanks to Professor Stroup for his contribution to the program.

Jos. W. E Harrisson, *Secretary.*

PITTSBURGH.

The April meeting of the Pittsburgh Branch of the American Pharmaceutical Association was largely attended. About fifty students of the College of Pharmacy were present, in addition to the regular attendants. President Lohmeyer expressed appreciation of the presence of so many students at his initial meeting and urged them to continue their interest in the work of the Branch, and invited their membership in the parent body.

The Secretary read a communication from the Pennsylvania Board of Pharmacy as follows:

"The only Tincture of Ginger, whether sold as Jamaica Ginger, essence of ginger, extract of ginger, or by whatever other name known, of lawful sale in the State of Pennsylvania is that which conforms to the requirements of the U. S. Pharmacopoeia IX. "Under Treasury Decision No. 3092, effective since February 16, 1921, this product is declared intoxicating liquor and may be sold only on prescription of a licensed physician having permit, on proper blanks, etc., by a druggist who has qualified as a Retail Liquor Dealer and paid the $25.00, per annum, special tax.

"The alcoholic extract or Tincture of Ginger made in accordance with the *process* described in the U. S. P. IX, page 469, from 400 Gm. of powdered Jamaica ginger and sufficient alcohol to make 1000 mils, which has been *classed* as unfit for beverage purposes by the Commissioner of Internal Revenue under Treasury Decision No. 3092, is not of lawful sale in Pennsylvania."

(Signed) The Pennsylvania Board of Pharmacy.

This ruling taken in connection with the Treasury Decision was interestingly discussed by President Emanuel, of the Board of Pharmacy, and B. E. Pritchard, during which it developed that sales of the product authorized as legal by the Internal Revenue Department would be illegal under the Food and Drugs Act of Pennsylvania and would subject the druggist dispensing the same to a severe penalty under the statute. Hence the only safety to the retail druggist lies in refusing its sale except upon prescription.

Two bills before the Legislature of Pennsylvania having for their object that no pharmacy as defined by the act to which this is a supplement shall be kept open for the transaction of business until it has been registered with and a permit therefor has been issued by the Pennsylvania Board of Pharmacy.

The second bill is in the form of an amendment to the Pharmacy Law.

"That the registration of any pharmacist or assistant pharmacist under this act of Assembly may be revoked by the Pennsylvania Board of Pharmacy when the registration is proved to have been obtained by fraudulent means" is mended by adding these words "or suspended or revoked upon being convicted for a second violation in connection with any law of this Commonwealth or of the United States."

These bills[1] were introduced in the Legislature by urgent request of the Western Pennsylvania Retail Druggists' Association, Inc., and have been heartily supported by the State Association as well as the A. Ph. A. branches of Pittsburgh and Philadelphia.

The program for this meeting included an illustrated lecture on National Park and Alaska, by Dr. I. K. King, who presented about fifty views taken by himself during a trip through Alaska. This was followed by "Blood Testing as a Side-Line in the Pharmacy, and the differential Blood Count," by Dr. L. K. Darbaker. The paper was illustrated by slides showing the work.

B. E. Pritchard, *Secretary.*

[1]They have since been signed by the Governor.

VIRGINIA.

On Wednesday evening, April 27th, a meeting of the Virginia Section of the American Pharmaceutical Association was held in the Old Colony Room of the Richmond Hotel, Richmond. There were about twenty members present, from all sections of the state. The meeting was presided over by Chairman W. G. Crockett. A dinner was served and there was much discussion of a paper read by Dr. Roshier W. Miller on the ever-increasing divergence in the relations of the pharmacist and the physician. There were also a few informal talks by members.

Members of the State Board of Pharmacy, which was in session in the city at the time, attended, and Mr. Harry Whitehouse, member of the Tennessee Board of Pharmacy, and representative of that board at recent meetings of the A. Ph. A. and N. A. B. P., was present as the guest of the Virginia Board. He addressed the meeting with a short and happily worded appreciation of his reception at the hands of the Virginians.

The next meeting of the Virginia Section will be held at Natural Bridge on June 21.

A. L. I. WINNE,
Secretary.

These reports were delayed on account of the printers' strike.

COMMITTEE OF REVISION, NATIONAL FORMULARY V, ATLANTIC CITY, N. J., JUNE 28–30, 1921.

Left to right, seated—lower three: H. A. B. Dunning, Baltimore, Md.; P. Henry Utech, Meadville, Pa.; E. L. Newcomb, Minneapolis, Minn. Upper three: Leonard A. Seltzer, Detroit, Mich.; Wilbur L. Scoville, Chairman, Detroit, Mich.; George M. Beringer, Camden, N. J. Standing: Hermann Engelhardt, Baltimore, Md.; Bernard Fantus, M.D., Chicago, Ill.; Otto Raubenheimer, Brooklyn, N. Y.; S. L. Hilton, Washington, D. C.; Charles H. LaWall, Philadelphia, Pa.; E. Fullerton Cook, Philadelphia, Pa.; Clyde M. Snow, Chicago, Ill; H. V. Arny, New York, N. Y.; C. A. Farwell, Detroit, Mich.

PHARMACEUTICAL FORMULAS

PROPOSED FOR "UNOFFICIAL FORMULAS, A. PH. A."

The formulas heretofore published will be found in Volume I, JOURNAL A. PH. A., pp. 169, 366, 505, 637, 760 and 1307; Volume V, pp. 309, 422, 529, 631, 748, 862, 991 (see also p. 1129), 1126, 1265 and 1397; Volume VI, pp. 79, 194, 298, 393, 486, 563, 643, 729 and 823.

For list of committee members and committees see April issue, p. 292. Suggestions for formulas, and comments on those published ars invited. They may be sent to a member of the committee or to chairman J. Leon Lascoff, 1223 Lexington Ave., New York. N. Y.

No. 668.

COMPOUND SALICYLIC ACID AND ZINC OXIDE OINTMENT.

ECZEMA OINTMENT.

Acid Salicylic	1.3	Gm.
Ointment of Zinc oxide	8.0	Gm.
Hydrous Wool Fat	8.0	Gm.
Solution of Calcium Hydroxide, a sufficient quantity,		
To make	60.0	Gm.

Contributed by Chairman J. Leon Lascoff.

No. 669.

COMPOUND SALICYLIC ACID GARGLE

Acid Salicylic	15.0	Gm.
Alcohol		
Spirit of Nitrous Ether		
Distilled Water, of each	30.0	Cc.
Oil of Wintergreen (Methyl Salicylate)		
Oil of Clove, of each	2.0	Cc.
Glycerin, a sufficient quantity,		
To make	120.0	Cc.

COMPOUND SALICYLIC ACID GARGLE WITH FORMALDEHYDE.

To every Cc. of above add one drop of solution of formaldehyde. This gargle gradually darkens to a reddish brown, but its efficiency is not impaired.

Direct to use 1 Cc. to one-fourth glass of hot water, as a gargle.

Contributed by I. A. Becker.

No. 670.

FURNITURE POLISH.

Linseed Oil	500.0	Cc.
Cedar Wood Oil	100.0	Cc.
Oil of Turpentine	300.0	Cc.
Cedar Leaf Oil	200.0	Cc.
Carbon Tetrachloride	400.0	Cc.

Directions for use.—Wipe off the furniture with a dry cloth; apply the polish to the damp cloth, and with it to the furniture. Rub well, and polish with a dry cloth.

Contributed by Mrs. M. A. Davis.

No. 671.

POLISHING POWDER FOR HARD METALS.

Infusorial Earth	80.0	Gm.
Tin Oxide	30.0	Gm.
Pipe Clay	30.0	Gm.
Tartaric Acid	3.0	Gm.

Powder and mix.

II.

Infusorial Earth	28.0	Gm.
Pipe Clay	40.0	Gm.
Sodium Hyposulphite	3.0	Gm.
Iron Oxide	2.0	Gm.

Powder and mix.

See also pp. 993 and 1397, Volume V, J. A. PH. A., 1916.

Contributed by Robert P. Fischelis.

No. 672.

BENEDICTS' PICRATE—PICRIC ACID SOLUTION.

Add 3.6 Gm. picric acid and 40 Cc. of hot distilled water to 50 Cc. of a 1 % sodium hydroxide solution. The mixture is shaken until the picric acid is dissolved. After cooling the solution is diluted to measure 100 Cc.

Contributed by J. Leon Lascoff.

No. 673.

FURNITURE POLISH.

Linseed Oil (Raw)	512.00	Cc.
Alcohol	24.00	Cc.
Antimony Trichloride (Butter of Antimony)	12.00	Cc.
Acetic Acid, 30%	3.00	Cc.
Hydrochloric Acid	3.00	Cc.

Mix, and allow to stand one week before using.

No. 674.

CAPPING FOR BOTTLES.

White Glue	30.00	Gm.
Water	45.00	Cc.
Glycerin	15.00	Cc.

Color to suit: zinc oxide for dull white, a

trace of ultramarine blue may be added; ammoniacal solution of carmine gives a transparent effect. The tops of the bottles and corks must be clean and dry. The mixture should be kept on a water-bath and the evaporation of the mixture made up by careful addition of hot water. The caps are trimmed, after the capping is thoroughly cooled, by cutting with a sharp knife

Contributed by Jeannot Hostmann.

No. 675.

NAIL POLISH.

Talcum	554.00	Gm.
Tin Chloride	334.90	Gm.
Tragacanth, powder	1.10	Gm.
Glycerin	110.00	Gm.
Carmine, to color		
Water		
To make	1000.00	Gm.

II.

NAIL POLISH, POWDER.

Talcum	334.00	Gm.
Tin Oxide	666.00	Gm.
Carmine and perfume to suit,		
To make	1000.00	Gm.

No. 676.

NAIL BLEACH.

Acid Oxalic	16.00	Gm.
Perfume to suit		
Water,		
To make	1000.00	Cc.

No. 677.

CAMPHOR ICE.

Liquid Petrolatum	120.00	Gm.
Paraffin (128-130 M. P.)	362.00	Gm.
White Petrolatum	482.00	Gm.
Camphor, powdered	36.00	Gm.
To make	1000.00	Gm.

No. 678.

COLD CREAM.

White Wax	126.00	Gm.
Paraffin (128-130 M. P.)	94.00	Gm.
White Ceresine (145 M. P.)	35.00	Gm.
Liquid Petrolatum	442.00	Gm.
Borax, powdered	8.00	Gm.
Distilled Water,		
To make	1000.00	Gm.

No. 679.

VANISHING CREAM.

Distilled Water	747.50	Cc.
Borax	50.75	Gm.
Sodium Carbonate	4.00	Gm.
Glycerin	64.25	Gm.
Stearic Acid	130.00	Gm.
Tragacanth, powdered	3.50	Gm.
To make	1000.00	Gm.

Place water, borax, sodium carbonate and glycerin in an enameled or heavily tinned double boiler; when quite warm add the stearic acid, previously broken into small pieces, stir occasionally. When dissolved add the tragacanth and then stir vigorously; let cool, and stir until smooth.

Contributed by Robert R. Gerstner.

See also Volume V, pp. 309 and 748

No. 680.

WHITE LIP STICK.

White Wax	300.00	Gm.
Spermaceti	300.00	Gm.
Liquid Petrolatum	400.00	Gm.
To make	1000.00	Gm.

No. 681.

LIP ROUGE.

Liquid Petrolatum	389.00	Gm.
White Wax	278.00	Gm.
Spermaceti	278.00	Gm.
Carmine	55.56	Gm.
Perfume to suit,		
To make	1000.00	Gm.

Rub the carmine to a smooth paste with the liquid petrolatum, then add remainder of liquid petrolatum; melt the wax and spermaceti and add the carmine mixture. Run through an ointment mill.

No. 682.

LIQUID ROUGE.

Carmine	51.00	Gm.
Distilled Water	775.00	Cc.
Stronger Ammonia Water	64.00	Cc.
Glycerin	110.00	Cc.
Perfume to suit,		
To make	1000.00	Cc.

No. 683.

LIQUID FACE POWDER.

Zinc Oxide	54.00	Gm.
Bismuth Oxychloride	54.00	Gm.
Distilled Water	807.00	Cc.
Glycerin	67.00	Cc.
Perfume to suit,		
To make	1000.00	Cc.

For "Face Powders" see also Volume V, p. 992.

BIBLIOGRAPHY OF PHARMACEUTICAL RESEARCH

Conducted by H. V. Arny, Reporter on the progress of Pharmacy, Chairman of the Committee on Research.

On these pages, each month, will be found a list of articles on pharmaceutical research that appear in the pharmaceutical and other scientific journals of the world. Whenever possible, the list appearing a certain month will record articles appearing in American journals of the preceding month and articles appearing in foreign journals will be recorded as quickly as possible after the journals reach the Reporter.

All articles appearing in these lists will be presented in abstract form in the bound volumes of the YEAR BOOK, which will be issued as soon after the end of the year represented as editing and printing conditions permit. Those desiring abstracts immediately can obtain same for a fee of one dollar each by communicating with H. V. Arny, 115 West 68th St., New York and arrangements can also be made for securing photographic reproduction of entire articles at moderate prices when such are desired.

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COUNCIL BUSINESS

A. PH. A. COUNCIL LETTER NO. 18.
(Abstract.)

WASHINGTON, D. C., May 2, 1921.

78. *Election of active members —Motion No. 77,* carried.

79. *Suggestion to consider the advisability of the employment of a full-time Secretary-Treasurer.* Under date of April 21, 1921, Prof. W. F. Rudd writes from Richmond, Va. as follows:

"I suggest that the Council consider the advisability of reorganizing the Association with the idea of employing a Secretary-Treasurer, who shall give his full time to the work of the Association. A frank expression of opinion from every member of the Council is urged.

My purpose in bringing this matter before the Council in the form of a suggestion is to avoid restricting in any way the latitude of discussion. A definite motion on the proposition will be offered later."

80. *Motion to change the date of the next annual meeting to be held in New Orleans.* It is moved by C. E. Caspari, seconded by S. L. Hilton, that the date of the next annual meeting be changed from the week beginning September 5 to the week beginning September 12.

This motion is offered for the purpose of avoiding a conflict with the next meeting of the American Chemical Society. The week beginning September 5, the American Chemical Society will hold a joint meeting with the British Society of Chemical Industry in New York, which it is thought a number of our members will attend. By changing the date of our meeting, attendance of the meetings of both societies will be possible.

In attempting to decide on the advisability of making this change, account should be taken of the fact that September 12 is a more suitable date than September 5 for the retail druggists since the schools open on or about September 1. The N. A. R. D. convention will be held in Denver beginning September 19. On the other hand, the latter date may make it inconvenient for some of the teachers in the colleges of pharmacy to attend, since these institutions usually open about September 20.

81. *Appointment of a committee to draw up suitable resolutions on the death of our esteemed colleague Henry P. Hynson.* It is moved by S. L. Hilton, seconded by H. C. Fuller, that a committee of three be appointed to draw up suitable resolutions.

A. G. DuMez,
Secretary.

A. PH. A. COUNCIL LETTER NO. 19.
(Abstract.)

WASHINGTON, D. C., May 26, 1921.

To the Members of the Council:

82. *Motion to change the date of the next annual meeting to be held in New Orleans—Discussion:* arguments for and against were presented; also for moving the date of meeting forward and setting it back. For the present these arguments have no effect owing to question of order by Jeannot Hostmann as follows: "I brought motion No. 80 before the members of the New York Local Branch at the regular meeting held last night. I have been instructed, by a unanimous vote, to not only vote in the negative, but also to protest against any change in date of the annual meeting.

I herewith rise to a question of order. The motion is out of order. It is not properly before the Council. Item No. 47, Council Letter No. 11 reads: '.....A majority of those voting on the time for holding our next annual meeting have expressed a preference for the week beginning September 5, 1921.....'

A motion to reconsider the former vote is the only proper method of again bringing the question before the Council.

Kindly have Chairman LaWall rule upon my Point of Order."

In compliance with the request contained in Prof. Hostmann's letter, your Secretary referred this matter to Chairman LaWall, whose ruling follows:

"In reply to your communication relative to the proposed change in date of meeting of the American Pharmaceutical Association, a motion concerning which has been discussed at some length, I feel that inasmuch as a point of order has been raised as to the propriety of the motion, I shall have to declare Motion No. 80 out of order.

The time and place were both decided upon after careful consideration, the week of Sep-

tember 5 was decided upon, and the only way to now properly discuss the matter is for some one to formally move for a reconsideration. Inasmuch as I believe that the change to the later date will be productive of more harm than good, in view of the comments I have seen and the opinions I have heard expressed, I hope the matter will be dropped and no further attempt made to change the date from September 5 to September 12."

Chairman LaWall's ruling means that this matter is closed as far as Motion No. 80 is concerned, and that the date originally decided upon (the week beginning September 5, 1921) is still in force.

83 and 84. *Appointment of committees to draw up suitable resolutions on the death of Henry P. Hynson, and of George Beecher Kauffman.*

85. *Election of Active members:* No. 480, Leo J. Snyder, 509 Pawnee St., Leavenworth, Kans.; No. 481, James L. Robert, 220 Chartres St., New Orleans, La.; No. 482, Margaret E. Savage, Corydon Apt. No. 1, Armistead Bridge Rd., Norfolk, Va.; No. 483, Baudilio Castellanos, c/o United Fruit Co., Preston, Oriente, Cuba; No. 484, Miss Allie Moog, Mobile, Ala.; No. 485, I. V. Wood, Mobile, Ala.; No. 486, Frank J. Helbig, 322 Waldron Street, West LaFayette, Ind.; No. 487, Otto William Wegner, 1705 Infantry Ave., Detroit, Mich.; No. 488, Fred Carl Pape, 6017 Grand River St., Detroit, Mich.; No. 489, Gaither C. Gaver, 723 Harlem Ave., Baltimore, Md.; No. 490, L. I. Marzouk, Rue Wagh El Berka No. 2, Cairo, Egypt; No. 491, Emile Hector Davian, 24 Summer Street, Waterville, Maine; No. 492, Napoleon Alphonse DesMarais, 130 Franklin St., Somersworth, N. H.; No. 493, Arthur Morris Earnshaw, Church Street, East Greenwich, R. I.; No. 494, Fred King, 24 Summer Street, Waterville, Maine; No. 495, Harry F. Morse, 42 Maple Street, Marlboro, Mass.; No. 496, Burritt Hill Pierce, 155 Vine Street, Hartford, Conn.; No. 497, Vernon Llewellyn Saunders, No. 3 Salem St., Houlton, Maine; No. 498, Geo. F. Shean, 90 Gainsborough St., Boston, Mass.; No. 499, Gordon James Williamson, 3 Charles St., Dorchester, Mass.; No. 500, Alva Melville Woodside, 87 White Street, East Boston, Mass.; No. 501, Eugene Elias Carleton, Union, Miss.; No. 503, Edwin Hetz, 100 E. North Ave., Baltimore, Md.; No. 504, John J. Vena, 245—3rd Street, Jersey City, N. J.; No. 505, Henry Shigon, 716 East 178th Street, New York, N. Y.; No. 506, Gordon L. Commons, 2430 University Ave., New York, N. Y.

A. G. DuMez, *Secretary.*

CORRESPONDENCE

THE "OLD APOTHECARY SHOP" OF THE CHARLESTON MUSEUM.

Wm. B. Day,
General Secretary American Pharmaceutical Association:

Your reply to my inquiry of May 2d, regarding Hoffmann's "retrospect of the Development of American Pharmacy," was very generous; I am correspondingly indebted to you, and the Museum to the Association, for your courtesy.

The unbound volume of the proceedings of the Association for 1902 came safely to hand some time ago, and only pressure of affairs prevented immediate acknowledgment.

The volume is of greatest interest to us at the present time, in connection with the Museum's reconstruction of the old Apothecary Shop of 1780. Not only Hoffmann's careful and exhaustive study of the subject is full of accurate information and illustrative material upon the early history of pharmacy in America, but there are in the volume, as you know, several papers of capital value in direct line with our purpose; notably: W. J. Schieffelin's "Advances Made in Pharmaceutical Preparations During the Last Fifty Years;" A. E. Ebert's "The Father of American Pharmacy;" J. L. Lemberger's "Landmarks of American Pharmacy and Development of Pharmacy During Fifty Years;" C. V. Emich's "Pharmacy of Fifty Years Ago;" E. L. Patch's "Past, Present, and Future," and the Chairman's address at the opening session.

Each of these contains material of moment, bearing on the growth of Pharmacy, from 1780 forward.

I do not know whether it will interest you or not, but venture to add that it appears to be established that South Carolina was the first State to establish and to require by law the necessary procedure of examining and licensing apothecaries, December 1817, the examination

being conducted and licenses issued by the Medical Society of South Carolina and the Physicians' Board of Columbia, S. C. in whom authority was vested. The Medical Society, organized 1789, at that time asked authority to correct the abuses found in the apothecaries' business, to prevent the vending of deteriorated or falsely represented drugs; but they seem to have been ahead of their times, for the authority was not given until 1817; then in full.

Let me thank you personally for your courtesy, and through you, for the Charleston Museum, convey cordial appreciation of favor received to the Pharmaceutical Association, for the Proceedings of the Association for 1902.

I remain, with regard,

(Signed) JOHN BENNETT, Assistant Curator,
Historical & Cultural Collections,
Charleston Museum.

CHARLESTON, S. C.
June 7, 1921

THE EXPLOSION AT EMORY UNIVERSITY.

The EDITOR:

The item concerning the explosion on March 22 which appears on page 312 of the April issue of the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION has just come to my attention. Possibly a little more "light" on the subject may prove of interest.

The explosion that took place on March 22 in the Department of Pharmacology (my department) of the School of Medicine of Emory University resulted in the injury of about thirty (30) members of the sophomore class in medicine and two members of the teaching staff. I had the sophomore class of sixty (60) men in the Laboratory of Pharmacodynamics at the time of the explosion. Of the thirty-odd injured, fortunately, only about 12 were seriously hurt. Eight had fractures of the foot, and one student had both feet fractured. One student had his left foot and his left arm fractured. Dr. M. F. Brown, Assistant Professor of Pharmacology, had his left tibia fractured and his back sprained. I had the os calcis and the cuboid of my left foot fractured in addition to several other dislocations. All were badly shocked and more or less bruised and cut. The cause of the explosion was the ignition of gas (used for Bunsen burners only and manufactured from gasoline) that had collected between the double floorings of the department from six or more leaks in the gas mains between the floors. All windows were blown out and the laboratory was very badly wrecked, the flooring having been blown out. So many have received the impression that the explosion was caused by something we were working with in the laboratory that a correction of this impression is possibly desirable.

On May 28 I was called to New York City because of the sudden death of my mother. Although still forced to use canes, I made the trip with my wife and returned to Atlanta on June 2 to continue my treatments. I am doing nicely although progress in foot injuries is rather slow. I was unfortunate enough to be the one most seriously injured, but still fortunate to escape alive. There were no fatalities in the explosion.

I assure you that both Mrs. Bliss and I greatly appreciated your kind letter and your good wishes.

(Signed) A. R. BLISS, JR.

EMORY UNIVERSITY, GA.
June 7, 1921

EDITORIAL NOTES

Editor: E. G. EBERLE, Bourse Building, Philadelphia, Pa.

Committee on Publication: A. G. DUMEZ, *Chairman;* J. H. BEAL, CHARLES H. LAWALL, CASWELL A. MAYO, H. B. MASON, and the Editor-in-Chief of the JOURNAL, General Secretary, Treasurer and Reporter on the Progress of Pharmacy, *ex-officio.*

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COÖPERATION OF PHYSICIANS, DENTISTS AND PHARMACISTS.

Recently there has been established, in Philadelphia, a bacteriological and pathological laboratory whereby real coöperation between dentists and physicians for the benefit of patients is effected. It has long been established that bodily ailments are frequently caused by diseased teeth, but the same attention has not been given to the fact that diseases of teeth may be due to bodily ailments. Herein is an opportunity for pharmacists, who will qualify for clinical laboratory work.

UNIVERSITY OF GEORGIA OFFICIALLY RECOGNIZES C. W. LONG, PHYSICIAN-PHARMACIST, AS DISCOVERER OF ANESTHESIA.

A bronze memorial and monument, the gift of Joseph Jacobs, pharmacist of Atlanta, Ga., was unveiled June 16, at Athens, Ga., by the University of Georgia in recognition and honor of Dr. Crawford Williamson Long as the discoverer of anesthesia. The donor was an apprentice in the pharmacy of Doctor Long, and has been ever faithful in his efforts to have recognition given to his preceptor as the discoverer of anesthesia. For other articles on the subject see Volume VIII, pp. 999 and 1040, and Volume IX, p. 108. Atlanta Sunday papers devoted a number of reading pages and illustrated inserts to the event.

THE BARTRAM GARDENS.

On several occasions brief reference has been made in these columns (see p. 753 Volume VI) to the home of John Bartram, pioneer American botanist. Philadelphia has a number of historic places sacred to the memory of every citizen, and many more which have an interest for one reason or another, and cannot well be taken care of by the city; it is perhaps for this reason that the grounds, which are owned by the City of Philadelphia, are neglected. Miss Anne Heygate Hall is the president of the John Bartram Association; our fellow-member Dr. A. W. Miller conducts visitors around the gardens on an anniversary day. The effort being made now is for its restoration by 1926, the time of the Sesquicentennial. This comes a year before a like anniversary of John Bartram's death. He died September 22, 1777, and within two years of the bicentennary of the founding of the garden, in 1728. John Bartram and his work are perhaps better known in Europe than here. Some of the plants of the Kew Garden are descendents of those Bartram took over and sketches of plants and trees made by him are kept under lock and key in the British Museum.

BIOLOGICAL EXPLORATION OF THE AMAZON.

Word has been received from Dr. H. H. Rusby and those accompanying him, of their safe arrival at La Paz, Bolivia. The members of the party, in addition to Dr. Rusby, are his secretary, personal assistant and taxidermist, George S. McCarty of Woodbury, N. J.; Dr. William M. Mann, entomologist of the Bureau of Entomology, U. S. Department of Agriculture, and Honorary Custodian in the Division of Insects, U. S. National Museum; E. N. Pearson, ichthyologist, representing Dr. C. H. Eigenmann of the University of Indiana and Dr. A. G. Ruthven of the University of Minnesota; Dr. Orland E. White of the Brooklyn Botanic Garden, who goes as representative of the Brooklyn Botanic Garden and of the Bussey Institution of Harvard University; Dr.

F. L. Hoffman, vice-president and chief statistician of the Prudential Life Insurance Co.

MADAME MARIE CURIE.

The following data relating to the life of Madame Curie find place in these columns for record:

Born November 7, 1867, in Warsaw, Poland.

Educated in Polish schools and aided her father in the Warsaw laboratory.

Graduated from the University of Paris as Doctor of Physics, in 1893, and received the degree, Doctor of Mathematics, in 1894.

Married Pierre Curie, an instructor in the Physics Department, University of Paris, in 1894.

In 1898 she discovered polonium, which she named after her native land, Poland, and later in the same year, with her husband she announced the discovery of radium.

Mme. Curie was awarded the Nobel prize for physics in 1903.

Her husband was killed in a motor accident in Paris in 1906, and she succeeded him as Professor of Chemistry at the University of Paris.

MARTYRS TO SCIENCE.

The French commission endowed by the Carnegie Foundation and headed by former Premier Loubet has awarded gold medals to Dr. Charles Infroit, whose fingers were amputated after X-ray burnings; Dr. Adolph Leray, who was badly burned, and Dr. Vaillant, head of the Salpetriere laboratories, who also is given 50,000 francs.

Dr. Infroit and Dr. Leray both died recently as a result of their X-ray research work. Dr. Vaillant suffered 10 amputations in 10 years. losing fingers, then a hand, and finally his left arm. He still is experimenting, however.

BIRTH AND DEATH OF LIVING CELLS.

The birth and death of living cells were shown at an April meeting of the American Philosophical Society. The pictures were exhibited by Dr. Alexis J. Carrel in connection with a talk on the famous "chicken heart," cells of which have been kept alive for nine years. The pictures shown on the screen by Dr. Carrel and his associates, Alessandro Fabbri and Dr. A. H. Eberlin, proved the famous "heart" to be cell proliferation from a small fragment, removed in 1912, from the heart of a chicken embryo. Mr. Fabbri explained that every forty-eight hours the cell mass is removed from the growing medium, and the new cells cut away from the old ones. The present "heart" is the 1500th generation. The reels showing the birth and death of cells were startlingly beautiful and thrillingly scientific; in the former, masses break away into flickering lines and finally form into living cells, while in the latter the operation is reversed, the dying cells are cast off and disintegrate.

TRYPANOCIDAL ACTION OF ARSENIC AND ANTIMONY COMPOUNDS.

"Quantitative studies by Carl Voegtlin, Homer W. Smith, and others, into the power of certain drugs to sterilize an infected animal, are the subject of a recent report to the U. S. Public Health Service. Specifically, the studies were directed to ascertain the minimum dose injected intravenously, of certain compounds of arsenic and antimony (important in the treatment of relapsing fever, syphilis, sleeping sickness, etc.), which would prove lethal to the majority of white rats that had been infected with trypanosoma and also the minimum dose that would prove effective in destroying the parasites.

"The minimum effective dose, below which the drug failed to destroy the parasites, was found to be fixed partly by the reaction between the drugs and the parasites, and partly by the rate at which the drug was absorbed by the tissues of the host. Thus, subeffective doses of antimony lactate ceased to act, not when they had killed a certain number of parasites, but when absorption by the host had lowered their concentration below their 'threshold.'

"Differences in the effectiveness of different arseno and pentravalent compounds are held to depend on the ease with which they are oxidized or reduced in the body, oxidation or reduction being necessary before they can exert their chief toxic action.

"The authors hold that, although the results obtained do not indicate with absolute accuracy the clinical value of a compound, they do furnish a valuable quantitative comparison with other compounds."

FRACTIONATION OF CHAULMOOGRA OIL.

"An article by A. L. Dean and Richard Wrenshall, just reprinted by the U. S. Public Health Service from the *Journal of the Ameri-*

can Chemical Society, describes experiments made at the University of Hawaii in the fractionation of chaulmoogra oil. The hope was to find a fraction that contained the curative principle without including the one that renders the whole oil intolerant to many patients.

"Four lines of experimental study were followed; (1) Separation of the fatty acids by crystallization from alcohol was tried and abandoned because the fractions gave low melting solids and oily mother liquids. (2) Separation by means of barium acetate was abandoned as unsuitable to production on a large scale. (3) Fractional distillation of ethyl esters under high pressure, though considered promising, was abandoned in favor of (4) Direct fractional distillation.

"By the last method four esters of the fatty acids of the oil were developed and were used on four groups of patients, a considerable number of whom became clinically and bacteriologically free from leprosy. But it was impossible to identify this effect with any one of the esters."

PERSONAL AND NEWS ITEMS.

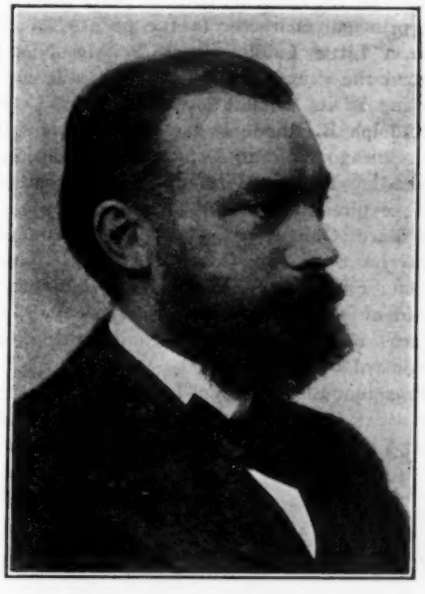
A. L. I. Winne, Secretary Virginia Pharmaceutical Association and one of the editors of the *Virginia Pharmacist*, is endeavoring to obtain data relative to meetings of the Virginia Association prior to those of 1888. Considerable interesting information relating to these meetings is given by the Secretary in the June number of the Virginia Pharmacist.

George E. Ewe, whose contributions have appeared in the JOURNAL A. PH. A., for a number of years and who has been a regular contributor to various A. PH. A. Sections, has resigned his position as Chief Chemist with H. K. Mulford Company, on account of poor health. Mr Ewe has settled on "Weather All" Farm, Frederick, Montgomery County, Pa. He writes that visits from pharmaceutical friends would be appreciated and the visitors given a hearty welcome. It is to be hoped that a few years of country life will restore his health and permit him to return to pharmaceutical activities.

Miss Mary A. Fein, Secretary-Treasurer Arkansas Association of Pharmacists celebrated her official "Silver Anniversary." Her years of service speak for her success, and the esteem of friends within the Association and elsewhere must be gratifying to her. Quite frequently she has attended the conventions of the A. PH. A., and State associations, and was active in making the Hot Springs Convention a success. Having started her secretarial duties early in life, the wish for an added twenty-five years will, we hope, find her still active in the work she loves so well.

Dr. Frederick B. Power was presented with a gold medal by Henry S. Wellcome in recognition of his distinguished services to science during 18½ years as director of the Wellcome Chemical Research Laboratories London. The presentation was made in Washington, May 9, in Assembly Hall of Cosmos Club, by Dr. Charles D. Walcott, secretary of the Smithsonian Institution and President of the National Academy of Sciences.

Doctor Power graduated from the Philadelphia College of Pharmacy in 1874 in the same class with Mr. Wellcome; the years of



F. B. POWER.

1876 to 1880 were spent in Strassburg, becoming assistant to Professor Flückiger. Returning he organized the Department of Pharmacy in the University of Wisconsin, where he remained nine years; then he devoted four years to researches on essential oils in the works of Fritzsche Brothers; in 1896 he accepted the appointment in the Wellcome Chemical Research Laboratories.

In 1908 the University of Wisconsin, com-

memorating the twenty-fifth anniversary of the formation of its Department of Pharmacy, conferred upon Doctor Power, its founder, the degree of LL. D., and in 1913 the Chemical, Linnean and Pharmaceutical Societies of London awarded him the Hanbury gold medal, a distinction only once previously bestowed upon an American, Prof. John M. Maisch. This was followed by the presentation of an illuminated address and an album containing the signature of contributors from many parts of the world. The half-tone herewith is from a souvenir of the occasion. Doctor Power is now in charge of the Photo-Chemical Laboratory, Bureau of Chemistry.

Charles F. Nixon, of Leominster, Massachusetts, enjoys the unusual distinction of being in business in the same location for forty-two consecutive years. Mr. Nixon was born in Sterling, Mass., in the house made famous by the residence there of Mary Sawyer, the principal character in the poem, "Mary Had a Little Lamb." In 1879, Mr. Nixon opened the drug store which he is still conducting in its present location.

Rudolph E. Rhode is the new president of the Chicago Veteran Druggists' Association, succeeding **E. Von Hermann**, whose term of office expired last month.

Willard Ohliger was elected president of Frederick Stearns & Company, May 11, succeeding Frederick K. Stearns, who had been president of the Company since 1889. Mr. Stearns resigned to accept chairmanship of the board of directors.

President-Elect Samuel L. Hilton, of the AMERICAN PHARMACEUTICAL ASSOCIATION, and Mrs. Virginia Lillian Williams, of Baltimore, were married May 26.

Dr. Reid Hunt, president of U. S. Pharmacopoeial Convention, has been appointed member of the Advisory Board of U. S. Hygienic Laboratory, to succeed the late Dr. W. T. Sedgwick.

Roy A. Haynes, editor of the *Hillsboro Dispatch* (Ohio) is the new Prohibition Commissioner, succeeding John F. Kramer.

David H. Blair of Winston-Salem, N. C., is the new Commissioner of Internal Revenue.

F. A. Thompson, president and manager of F. A. Thompson & Company, Detroit, Mich., has resigned and after a short vacation will engage in manufacturing business.

Herman A. Metz succeeds Oscar S. Strauss, former secretary of Commerce and Labor, as Chairman of the national coöperating committee of the Southern Commercial Congress.

The duPont Co. has completed a motion picture filmed at its works at Deepwater Point, N. J., and showing the operations of a large dye plant. The picture covers two reels. It is now being shown at colleges, technical schools and before trade bodies.

W. B. Saunders Company, Publishers, have opened recreation and rest rooms for their employees. The rooms have been artistically furnished; comfort and service prompted the plans.

The Absecon Light, official and publicity periodical of the National Wholesale Druggists' Association, has made its appearance. The preconvention numbers will follow each other in conveying messages to the members; the first issue carries those of President L. D. Sales and Chairman E. D. Taylor, of the Committee on Arrangements and Entertainment.

OBITUARY.

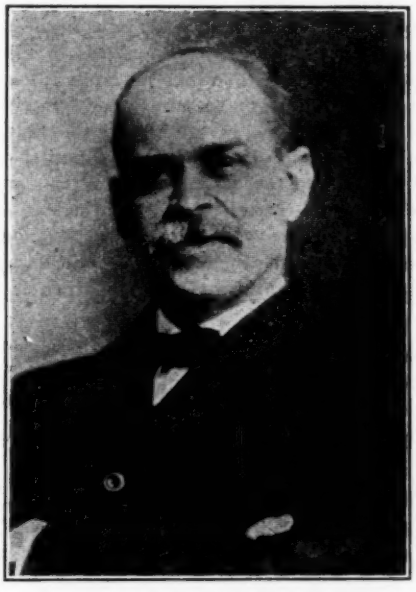
GEORGE BEECHER KAUFFMAN.

George Beecher Kauffman, for more than thirty years a member of the faculty of the College of Pharmacy, Ohio State University, and also its dean, died at his home in Columbus, Ohio, April 28, 1921, aged 65 years. He was born at Lancaster, Ohio, September 19, 1855; here he received his earlier education and then attended Wesleyan University where he won the degree of B.Sc.; later in life he received the honorary degree of Doctor of Pharmacy from Scio University.

Mr. Kauffman's first business venture was in Zanesville, Ohio, but very soon thereafter he came to Columbus, where he formed a partnership with John Rarey, which continued for a year, when he bought out the latter's interest, and in 1881, established the Kauffman-Lattimer Company, the other members of the firm being Linus B. Kauffman, a brother, and the late George W. Lattimer.

The deceased was a prime mover for Ohio's first pharmacy law in 1884; the College of Pharmacy at the State University was established in the following year and Professor Kauffman was the first one chosen to occupy the chair of pharmacy. He was president of the American Conference of Pharmaceutical Faculties in 1904–05 and president of the Ohio Pharmaceutical Association in 1897–98.

Doctor Kauffman established the *Midland Druggist* in the late 90's and later the *Pharmaceutical Review* became attached. His business judgment was not only displayed in his writings but in the success of the wholesale house of which he was for many years the head, and by his participation in other enterprises, the American Druggists, Fire Insurance Company, etc.



GEORGE B. KAUFFMAN.

Mr. Kauffman joined the American Pharmaceutical Association in 1882; he was for a number of years a member of the Council and his good judgment and wise counsel contributed largely to decisions and actions.

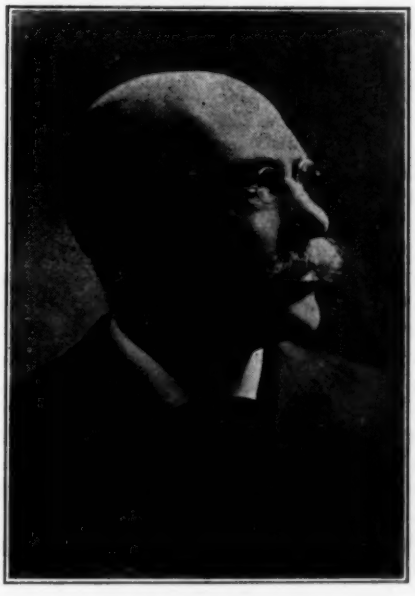
Mrs. Kauffman, nee Hughes, and five children survive the deceased. Members of the University faculty and business associates were active and honorary pall bearers, nd Ex-President Lewis C. Hopp represented the American Pharmaceutical Association. For a number of years the office of the Journal A. Ph. A. was located in the rooms of the *Midland Druggist*, of which Mr. Kauffman was the editor.

WILLIAM BROWN COGSWELL.

William B. Cogswell, founder of the Solvay process, died in New York City, June 7, aged eighty-seven years. He was born in Oswego, N. Y., September 22, 1834. His studies were completed in the Rensselaer Polytechnic Institute. His greatest achievement was the development of the Solvay process. Many organizations, American and foreign, honored him with membership.

CYRUS PACKARD WALBRIDGE.

Lieutenant-Colonel Cyrus P. Walbridge, member of the American Pharmaceutical Association since 1901, was born at Madrid, N. Y., July 20, 1849. His parents removed to Minnesota, and the son received his earlier education at Northfield, in Carleton College; later he graduated from the law school of the University of Michigan, and for several years practiced law in Minneapolis. He came to St. Louis in 1876 where, subsequently, his services in the state militia brought him into business relations with Jacob S. Merrell and, later, he became a member of the firm, J. S. Merrell Drug Co., of which he was president for about thirty-five years. After his election as president of the Company Mr. Walbridge entered as student in the St. Louis College of Pharmacy, in order to better qualify himself for the drug business.



CYRUS P. WALBRIDGE.

The deceased was a member of the Missouri House of Delegates in 1881, president of the St. Louis City Council in 1893 and Mayor of the City from 1893 to 1897. He was a vice-

president of the Louisiana Purchase Exposition, served in important state and municipal appointments, and was an honored member of many civic, social, fraternal and business organizations; in 1898, he was president of the National Wholesale Druggists, Association.

Mr. Walbridge died at his home in Mound City, May 1; Mrs. Walbridge, who preceded him in 1912, was a daughter of the late Jacob S. Merrell; a son, Merrell P. Walbridge, survives the deceased.

MRS. CHARLOTTE J. MAISCH.

Mrs. Charlotte J. Maisch, widow of Prof. John M. Maisch, for many years dean of the faculty of the Philadelphia College of Pharmacy, died June 19, in Lankenau Hospital, Philadelphia. She was 81 years old; surviving her are three sons and two daughters. Mrs. Maisch was interested in charitable work connected with the Lutheran Church. For years she had been a member of the Ladies' Aid Society connected with Lankenau Hospital, and was a member of the board of visitors of the Lutheran Orphanage.

The deceased was well known to the older members of the Association, and the name of Professor Maisch is part of pharmacy and the history of the American Pharmaceutical Association. Reference to the Index of the Proceedings of the Association gives a suggestion of the work done by the eminent editor, pharmacist, botanist and pharmacognosist. During recent years Mrs. Maisch did not attend the annual conventions, but she continued to hold an interest in matters pharmaceutical.

EDWARD B. ROSA.

Dr. Edward B. Rosa, chief physicist of the Bureau of Standards, died May 17, aged sixty years. After several university appointments, he entered the Bureau of Standards in 1901. Among the work with which his name is associated are found the respiration calorimeter used in food-value investigations; the determination of the ampere; the computing of inductions; and the determination of the laws of electrolytic corrosion. During the war he was one of the heavy contributors to the development of sound ranging, the geophone, aircraft radio apparatus and directional wireless.

SIR JAMES HORLICK, BT.

Sir James Horlick, of Horlick's Malted Milk Company, London, England, died May 7, aged seventy-seven years. His three sons served in the British Army and the youngest made the supreme sacrifice; the survivors are Captain Ernest Burford and Lieutenant-Colonel J. N. Horlick.

SOCIETIES AND COLLEGES.

ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, NEW ORLEANS, LA., SEPTEMBER 5–10, 1921.

The time for opening the convention of the American Pharmaceutical Association, in sixty-ninth annual session, is drawing near. Contributors of papers should at once send in titles of papers they intend to submit, and as soon thereafter as possible, the paper with a brief abstract thereof. When the time prior to the meeting is considered, the importance and necessity of early compliance with these instructions need not be further emphasized, for aside from arranging the papers for reading and discussion, the programs must be printed and should appear in a pre-convention number of the JOURNAL. Will you do your part? The names of section officers with their addresses are printed in the May number.

SCIENTIFIC SECTION.

Papers are solicited for the Scientific Section, A. Ph. A., on chemical, botanical, pharmacological, pharmacognostical, bacteriological and other Scientific themes. All papers should be in the hands of the Secretary not later than August 1 and, no later than August 20, for inclusion in the printed program.

A. G. DUMEZ, *Chairman*,
Hygienic Laboratory,
Washington, D. C.

HEBER W. YOUNGKEN, *Secretary*.
145 No. 10th Street,
Philadelphia, Pa.

SECTION ON PRACTICAL PHARMACY AND DISPENSING.

The Section on Practical Pharmacy and Dispensing solicits papers on subjects pertaining to the specific work of the section. The following general topics are suggested, but in no way restricted to them. Helpful papers on any phase of the work of this Section will be welcomed.

1. Alcohol substitutes.
2. Incompatible prescriptions.
3. Criticisms of Official Formulas.
4. New Formulas for pharmaceutical preparations.
5. Soliciting prescription practice.
6. The status of clinical service as a phase of pharmaceutical service.
7. Pharmaceutical Research.
8. Formula for Emulsion of creosote carbonate.
9. Notes on the Newer Remedies.
10. The Incompatibilities of the Newer Remedies.

Papers should be in the hands of the Secretary of the Section, Prof. H. M. Faser, University, Miss., not later than August the 1st, and titles of said papers, as well as a short résumé of their contents, should be mailed to the Chairman of the Section as promptly as possible.

IVOR GRIFFITH,
Chairman.

Stetson Hospital,
Philadelphia, Pa.

SECTION ON HISTORICAL PHARMACY.

The Section on Historical Pharmacy solicits papers on any phase of historical pharmacy, relating to the industries, commerce, education, etc.; the place of pharmacy in literature; the history of associations, schools of pharmacy, life and work of individuals.

The Section will also be glad to receive for the Association contributions of historical interest: apparatus, books, etc., associated with the lives of pharmacists who have passed away. All such contributions should be marked with the name of the donor and a brief statement relative to its historic value; it is desirable that a more complete record be made in a paper presented to the Section. The article so contributed should be sent to the American Pharmaceutical Association, 253 Bourse Building, Philadelphia, Pa., or in care of the convention in New Orleans.

CURT P. WIMMER, *Chairman.*

115 N. 68th St.
New York, N. Y.

AMERICAN ASSOCIATION OF PHARMACEUTICAL CHEMISTS NOW AMERICAN PHARMACEUTICAL MANUFACTURERS' ASSOCIATION.

The annual meeting of the Association, now known as the American Pharmaceutical Manufacturers' Association, was held at Wenalancet, N. H., June 13–18. President Harry Noonan gave a résumé of the work of the Association; in viewing the future he was optimistic, but recommended caution during the present reconstructive period. The change of name for the Association was one of the President's recommendations. Quite a number of papers were presented dealing with management, manufacturing and other phases of the business. The retiring president was recipient of a gold watch, a gift of the Association. The following are the officers for 1921–1922:

President, C. H. Searle, Chicago, Ill., *Vice-Presidents;* D. H. Lohman, Lafayette, Ind., and E. B. Caldwell, Mansfield, Ohio; *Secretary-Treasurer,* Ralph R. Patch, Boston, Mass. Cleveland was tentatively agreed upon for the next place of meeting.

NATIONAL WHOLESALE DRUGGISTS' ASSOCIATION MEETING AT ATLANTIC CITY.

The program for the N. W. D. A. convention at Atlantic City, September 26–29, is being completed. Reservations already show a total of 325 who will be on hand. Hotel Traymore will be the headquarters.

OFFICERS OF MANUFACTURING CHEMISTS' ASSOCIATION.

The officers for the ensuing year of the Manufacturing Chemists' Association are: *President,* Dr. Charles L. Reese, duPont Co.; *Vice-President,* H. H. S. Handy, Semet Solvay Co.; *Vice-President,* C. Wilbur Miller, Davison Chemical Co.; *Treasurer,* S. W. Wilder, Merrimac Chemical Co.; *Secretary,* J. I. Tierney, Washington D. C.

Executive Committee: Henry Howard, Grasselli Chemical Co., *chairman;* Adolph G. Rosengarten, Powers - Weightman - Rosengarten Co.; Lancaster Morgan, General Chemical Co.; C. Wilbur Miller, D. W. Jayne, Barrett Co.; H. H. Dow, Dow Chemical Co.; E. L. Pierce, Solvay Process Co.

VACATION AND VOCATION.

An interchange of a and o in the two words of the title brings about an exchange of definitions; these letters have a closer relation than any other two vowels. Perhaps there is a further significance in that the first and last are indicated, alpha and omega; and, without an occasional vacation, vocation comes to an

end; the one who does not take vacations might have lived, and been of greater service. Have your vacation include attendance at the American Pharmaceutical Association convention in New Orleans, during the week of September 5.

THE CENTENNIALS OF HERMAN VON HELMHOLTZ AND RUDOLPH VIRCHOW.

The meeting of the Research Club of the University of Michigan, of April 20, commemorated the centennials of Herman von Helmholtz and Rudolph Virchow. The former was born in Potsdam, August 31, 1821, the son of a teacher of philology and philosophy, and his mother was a lineal descendent of William Penn. The Pomeranian town, Schivelbein, lays claim to Virchow, and the date of his birth is October 13, 1821, the son of a farmer who combined that occupation with that of a retail merchant.

Helmholtz was one of the world's great mathematical physicists; his position among scientists was early established by his invention of the ophthalmoscope.

Osler wrote of Virchow: "As an illustration of his capacity for varied work, I recall one day in 1884, in which he gave the morning demonstration and lecture at the Pathological Institute, addressed the Town Council at great length on the extension of the canalization scheme, and made a budget speech in the House, both of which were reported at great length in papers of the next day."

Prof. Louis C. Karpinski, University of Michigan, in a paper on the occasion, said: "Helmholtz, it should be noted, resolutely set himself against any commercial or financial exploitation of his researches."

Dr. C. V. Weller, University of Michigan, stated in his contribution: "To Virchow we owe our conception of disease. Disease is not an entity, entering the body from without. Disease is life, life which deviates from the normal. The casual factor may reside within or may come from without in the form of trauma, infection, intoxication or what not, but the cause is not the disease. The disease is the abnormal life of the body cells. The methods of modern medicine are therefore broadly biologic, and along this road of promise Rudolph Virchow pointed the way."

The latter died September 5, 1902, Helmholtz, September 8, 1894.

The *Scientific Monthly*, July 1921, p. 39.

COMMENCEMENTS OF THE SCHOOLS AND COLLEGES OF PHARMACY.

The commencements of the schools and colleges of pharmacy have shown that, in most instances, the institutions have been taxed to a limit which prompts extension. Unfortunately, this is not possible in all cases; there is, however, another phase of the situation, namely, that it is possible to make better selection of the students, and the indications are good for large classes next year.

A number of additional states passed prerequisite laws and in others the Boards of Pharmacy are authorized to fix the examination requirements for candidates. Taking these matters into consideration, real progress is shown; that there is opportunity for greater advance is repeating the foregoing statement. One of the American colleges of pharmacy has passed its one-hundredth anniversary, and a Canadian institution, the Ontario College of Pharmacy, celebrated its fiftieth birthday. A number of our colleges are nearing their centenary, hopeful that the years of work have not only found favor, but awakened a spirit of helpfulness in those who can contribute to the opportunities for greater service.

JUBILEE CELEBRATION OF THE ONTARIO COLLEGE OF PHARMACY.

The fiftieth anniversary of the Ontario College of Pharmacy was celebrated June 13–15. The program was interesting and such publicity had been given that the attendance was highly satisfactory. The first dean of the College, Prof. E. B. Shuttleworth, was present, and his address dealt largely with the genesis of the College. Prof. Charles F. Heebner, member of the A. Ph. A., has been dean for quite a number of years.

The first "set function" was the unveiling and dedication of the "Memorial Tablet," in commemoration of 366 members of the College, who had served in the Great War. The names of the fallen, twenty-eight in number, are in a center panel of the tablet. The second day was given over to entertainments. Among the speakers were men prominent in Canadian affairs; Mr. Henry Watters, who has on a number of occasions been an attendant at A. Ph. A. conventions, and, as the *Canadian Pharmaceutical Journal* states, "Dr. H. V. Arny took his audience on an interesting trip through Fifty Years of

American Pharmacy, and pointed out the shoals ahead of to-day's trends, and appealed to the young men now entering, for unselfish devotion to higher ideals in the craft and effort to save it from the menace threatening destruction to the professional side."

The third day was "Alumni Day;" there were present members of the first graduating class, and the first dean, Prof. E. B. Shuttleworth, and many of other classes. The records of the event seem to indicate that an Alumni Association was organized; if so, it is a good move, but such an organization should have been active for many years. Congratulations are extended to the Ontario College of Pharmacy, on the completion of two quarters of the first century, and best wishes for even greater success in the coming years.

CENTENNIAL CELEBRATIONS OF THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE.

The Centennial Celebrations of the Philadelphia College of Pharmacy and Science opened with the baccalaureate service on Sunday, June 12, and ended with the commencement exercises on Wednesday, June 15.

The Annual Alumni meeting was held Monday and, besides the faculty dinner at night, included an address during the afternoon by Dr. William Duffield Robinson, President of the Association, and an illustrated historical lecture by Prof. E. Fullerton Cook.

The Centennial Day exercises were presided over by Admiral William C. Braisted, President of the College. "The Significance of Education" was the theme of William H. Carpenter, Ph.D., provost of Columbia University; Dr. S. Solis Cohen spoke on "The Relation of Pharmacy to Medicine" and "The Future of the Philadelphia College of Pharmacy and Science" was the subject of an address by Dean Charles H. LaWall. The Centennial Banquet and President's Reception closed the day. Joseph W. England spoke of the College, its past, present and future; "The Alumni" were subjects of Dr. W. D. Robinson and Dean J. W. Sturmer; E. G. Eberle spoke briefly on American Pharmacy, and that of the Navy was presented by Admiral W. C. Braisted, of the Army by Major A. P. Clark. Memories and visions were topics of other speakers, among them an alumnus of 1854. The evening passed into morning before the ceremonies were concluded; the attendance was largest in the history of the College; about eight hundred participated.

OFFICERS OF STATE PHARMACEUTICAL ASSOCIATIONS, 1921–1922.

(Secretaries of associations are asked to make corrections and send in list of officers, and name of next convention city.)

CALIFORNIA.

President, A. L. Hawkins, Pasadena.
First Vice-President, L. J. Freeman, Oakland.
Second Vice-President, Harry A. Dutton, Los Angeles.
Secretary-Treasurer, Edward A. Henderson, Los Angeles.

ILLINOIS.

President, Fred W. Rauth, Springfield.
First Vice-President, D. L. Antonow, Chicago.
Second Vice-President, F. L. Pfaff, Centralia.
Third Vice-President, M. J. Hogan, Taylorville.
Secretary, W. B. Day, Chicago.
Treasurer, Geo. M. Bennett, Urbana.

IOWA.

President, George Judisch, Ames.
First Vice-President, L. E. Davis, Cedar Rapids.
Second Vice-President, Carl Schlegel, Davenport.
Third Vice-President, A. F. Singer, Sioux City.
Secretary, Al. Falkenhainer, Algona.
Treasurer, J. M. Lindly, Winfield.

MASSACHUSETTS.

President, William H. Glover, Lawrence.
First Vice-President, Timothy J. Shea, Worcester.
Second Vice-President, Fred E. Jones, Lowell.
Secretary, James F. Guerin, Worcester.
Treasurer, J. J. Tobin, South Boston.

MARYLAND.

President, R. E. Lee Williamson, Baltimore.
First Vice-President, E. Rial White, Salisbury.
Second Vice-President, James W. Westcott, Baltimore.
Third Vice-President, W. K. Edwards, Cumberland.
Secretary, E. F. Kelly, Baltimore.
Treasurer, Samuel Y. Harris, Baltimore.

MINNESOTA.

President, E. A. Grochau, Duluth.

First Vice-President, Harry C. Trowbridge, Austin.

Second Vice-President, M. G. Johnson, St. Paul.

Third Vice-President, Miss Frances M. Greenwald, St. Paul.

Secretary, Gustav Bachman, Minneapolis.

Treasurer, M. A. Karra, St. Paul.

NEBRASKA.

President, W. E. Clayton, Grand Island.

First Vice-President, Loren Jordan, David City.

Second Vice-President, L. H. Leavy, Columbus.

Third Vice-President, P. J. Auxier, Omaha.

Fourth Vice-President, W. A. Goodwin, Columbus.

Fifth Vice-President, H. H. Harley, Lincoln.

Secretary, J. G. McBride, University Place.

Treasurer, D. D. Adams, Nehawka.

Fremont was selected as the place for holding the next annual convention.

(To be continued)

THE PHARMACIST AND THE LAW.

FANATICISM IN PROHIBITION.

The *New York Commercial* said in a recent editorial that, "it may be difficult for those in large cities to believe, but it is undoubtedly true that the sentiment of the country is in favor of prohibition." Reasons are then given, supported by argument, for the legislation and why the enforcement of prohibition laws presents more and greater difficulties than other legislation. The part of the editorial, however, which prompts this selection, is that which makes use of the reasons assigned by Chief Counsel Van Buren for his resignation. This has somewhat general application to other laws, and reads in part: "Extremists, who seem to have control of Congress, are causing a great deal of unnecessary irritation without accomplishing any corresponding good. They are treating alcohol as if it were a virulent poison, trying to eliminate it from every possible use, legitimate and illegitimate. They have gone so far that Chief Counsel, Van Buren, to the Federal Prohibition Commissioner has resigned his office, notwithstanding the fact that he is a prohibitionist. He declares that the restrictions have gone so far that they are interfering with the practice of medicine, pharmacy, chemistry and even religion. Evidence of this is shown in the bill now before Congress that would prevent physicians prescribing beer for their patients. It may be that some unscrupulous physicians will prescribe beer for patients whose only ailment is unquenchable thirst, and it may be a question also among physicians as to whether beer is any real benefit in case of sickness. That, however, is a question for physicians to decide, and the amount of abuse likely to result from lack of restriction will not be as great in its evil results as the contempt for law which it will arouse in the minds of a considerable portion of an otherwise law-respecting community.

"Mr. Van Buren, who says he has never taken a drop of liquor in his life, states in his letter of resignation, that the success of prohibition demands that 'respect for law must be maintained at any cost, and this cannot be accomplished by the further curtailment of personal liberties and useless restrictions. Prohibition cannot be established in eighteen months. The same law which prohibits alcohol, the basis of all intoxicating liquors, for beverage purposes, provides in no mistaken language that its legitimate non-beverage use shall be encouraged and promoted. Those advocating more drastic rules loudly proclaim that they do not intend to embarrass or disturb legitimate industries and occupations, but they go ahead just the same and do so.

"Sanity and conservatism need to be taught to the reformers of the uplift type just as much as among those who are advocating a policy of destruction."

NEW PENNSYLVANIA LAWS.

The following references to Pennsylvania laws are taken from a report of the Committee on Legislation of the Philadelphia Drug Exchange. Mr. Campbell, who introduced and was successful in passing H. R. 664 and 665, is a member of the American Pharmaceutical Association, and has been a legislator for a number of terms. The reason for these measures is to prevent saloons from being dubbed pharmacies or drug stores, and conversion of the latter into saloons. Revocation of license or permit for violation of laws is the means whereby the laws are made effective.

H. R. 684 amends the State Pharmacy Act of 1917, requiring the registration of pharmacists, it provides that where such registration had been obtained by fraudulent means, or where the holder had been convicted for a second violation in connection with the practice of pharmacy or of any law of this Commonwealth or of the United States, such registration may be revoked by the Pennsylvania Board of Pharmacy. The balance of the bill changed the fees for registration and some personal requirements.

H. R. Bill No. 665 is a Supplement to the State Pharmacy Act of 1917, in which the correction was made that the permit of the Board of Pharmacy should not be construed to apply to any store or stores opened for the sale of any proprietary or so-called patent medicines. It also provides for a permit to be issued on payment of a fee of $2.00 to conduct a pharmacy, and that the Board may suspend or revoke such permit if obtained by false representations in the application, or when a pharmacy is kept open for the transaction of business without a registered pharmacist in charge, or upon conviction for a second or subsequent violation of laws of the Commonwealth or of the United States pertaining to the drug business or sale of intoxicating liquors, or for aiding or abetting in the violation of any such law. The third section of the act provides penalties.

H. R. Bill 449—Senate 707, was an amendment to the Narcotic Act, giving the State Department of Health entire control of the situation in the sale and use of opium or coca, or compounds, derivations or preparations of the same, and finally reached the Governor, and was approved by him on April 20. It affects physicians, dentists, veterinarians, pharmacists and nurses.

H. R. Bill 400—Senate 705—prohibiting advertisements of remedies for venereal diseases and prescribing penalties, passed both houses, and was approved by the Governor April 21.

NARCOTIC SALES TO PHYSICIANS COME UNDER MANUFACTURERS' REGULATION.

In an opinion furnished to the American Drug Manufacturers' Association, the Treasury Department officials say that the provisions of article 26 of Narcotic Regulations 35, revised, are applicable to the druggist registered only in class 3 who makes a limited number of sales of narcotic drugs to physicians as well as to the person who engages in the business of manufacturer or producer (in Class 1) exclusively.

ARKANSAS PHARMACY LAW IS AMENDED TO PROVIDE FOR MAINTENANCE OF RECORDS AND A BUREAU OF TECHNICAL INFORMATION.

R. R. Townsend, member of the Arkansas Senate, and also of the State Association and American Pharmaceutical Association, was successful in having the Arkansas Pharmacy Law amended in establishing coöperative service. Section 4 reads:

"It shall be the duty of the State Board of Pharmacy to issue bulletins from time to time, informing pharmacists of important United States Public Health regulations; service and regulatory announcements of the Bureau of Chemistry in the United States Department of Agriculture, and decisions of the United States Treasury Department relating to the possession, use, and sale of non-beverage U. S. P. Alcohol, and the Harrison-Wright Anti-Narcotic Act. The said Board shall be fully advised respecting the eligibility and qualifications of all persons whom they admit to the examination and to whom they grant registration, and for this purpose, shall secure the services of the National Association of Boards of Pharmacy and the Arkansas Association of Pharmacists, and shall pay for such service as the Board may determine but not to exceed One Dollar ($1.00) of each renewal fee annually paid. The fee for renewal certificate shall be Two Dollars ($2.00) payable annually to the Board of Pharmacy, as they may determine on or before April 1 of each year. The said Board of Pharmacy shall demand and receive a uniform fee of Fifteen Dollars ($15.00) in full satisfaction for all services in issuing temporary permits (which admit to the examination at expiration), registration by reciprocity with other State Boards, or accredited Colleges of Pharmacy."

BRUCINE FOR DENATURING ALCOHOL USED IN PERFUMES, ETC.

The industrial alcohol division of the Internal Revenue Bureau has issued a formula, known as denaturing formula No. 40, allowing tax-free alcohol to be employed in the manufacture of perfumery and high grade toilet articles. Acetone and brucine sulphate are

the denaturants used, according to the following formula:

To every 100 gallons of pure ethyl alcohol add 3 ounces, avoirdupois, brucine sulphate, one-half gallon acetone, U. S. P.

The brucine sulphate [$(C_{23}H_{26}N_2O_4)_2$ H_2SO_4 $7H_2O$—(Henry) dimethoxystrychnine] used must comply with specifications given in detail in the official communication with regard to physical properties, identification with barium chloride and nitric acid—stannous chloride test and freedom from strychnine.

BOOK NOTICES AND REVIEWS.

The Elements of Vegetable Histology. By C. W. Ballard, Associate Professor of Materia Medica and Director of the Microscopical Laboratory, College of Pharmacy, Columbia University; Microanalyst, Department of Health, City of New York. 246 pp. Price $3.00. Published by John Wiley & Sons, Inc., 432. Fourth Avenue, New York.

Coming out at this time when more value is being placed on the microscopic examination of foods and drugs, this very excellent book should be heartily welcomed by teachers and those desiring a good foundation in Vegetable Histology.

As stated by the author, the book is intended for the beginner, and as such it places in the hands of the student material on which he may build a real foundation of the subject. Well begun is half done.

The three chapters on the preparation, mounting and staining of specimens are very clear, concise and have much valuable information condensed into twenty-seven pages.

To be a successful microanalyst, one must know well his all-important instrument, the compound microscope. The author has recognized this fact and so has given one chapter to the description of it as well as giving the reader the benefit of his years of practical use of the instrument. It is interesting to note in this chapter the statement that, "contrary to popular opinion, microscopical work is not injurious to the eyes."

The chapters on "The Chemical Reactions of Plant Tissues" and "Cell Contents" give, in a very precise manner, the fundamentals necessary to understand these two subdivisions of the subject. It seems quite helpful to have a brief statement of the function of the tissue accompany the detailed description of it. The tissues are grouped and described in a masterly manner in chapters according to their function such as "Covering Tissues," "Supporting Tissues," "Absorption Tissues," "Conducting Tissues" and "Tissues for Synthesis, Assimilation and Storage."

The structure of each organ of the plant is described fully, comparing such parts as leaf with the floral parts, stem with root and seed with fruit. In all, the statements are brief but comprehensive and full of meaning.

The chapter on "Microscope Accessories" describes such valuable pieces as the micrometer and polarizer. In three pages the polarizing apparatus is described in such a concise way that the student should be able to use this attachment quite successfully.

In the Appendix all formulas necessary in an elementary course of this kind are given and also a good list of reference books for the student who wishes to enlarge his studies. C. J. Z.

PUBLICATIONS RECEIVED.

Proceedings of the Twenty-first Annual Meeting of the American Conference of Pharmaceutical Faculties, held in Washington, D. C. May 5–6, 1920. These proceedings contain, a list of past and present officers, committees, and a number of valuable papers; also the Constitution and By-Laws of the organization. The book has 200 pages.

The Digest of Comments on the Pharmacopoeia of the United States of America and on the National Formulary for the calendar year ending December 31, 1917. Hygienic Laboratory Bulletin 125.

This bulletin is the thirteenth number of the series of Digest of Comments and contains references to all the important literature on the items contained in the U. S. P. and N. F. published during the year 1917.

Comment has been made on prior editions of this valuable digest of comments on the Official Standards, and this issue shows the same care heretofore given. While its usefulness is appreciated most by the revisers of the U. S. P. and N. F., it has value a sa reference book in the laboratory and library. The work on this volume, as also on a number of previous numbers, was done by and under the direction of A. G. DuMez.